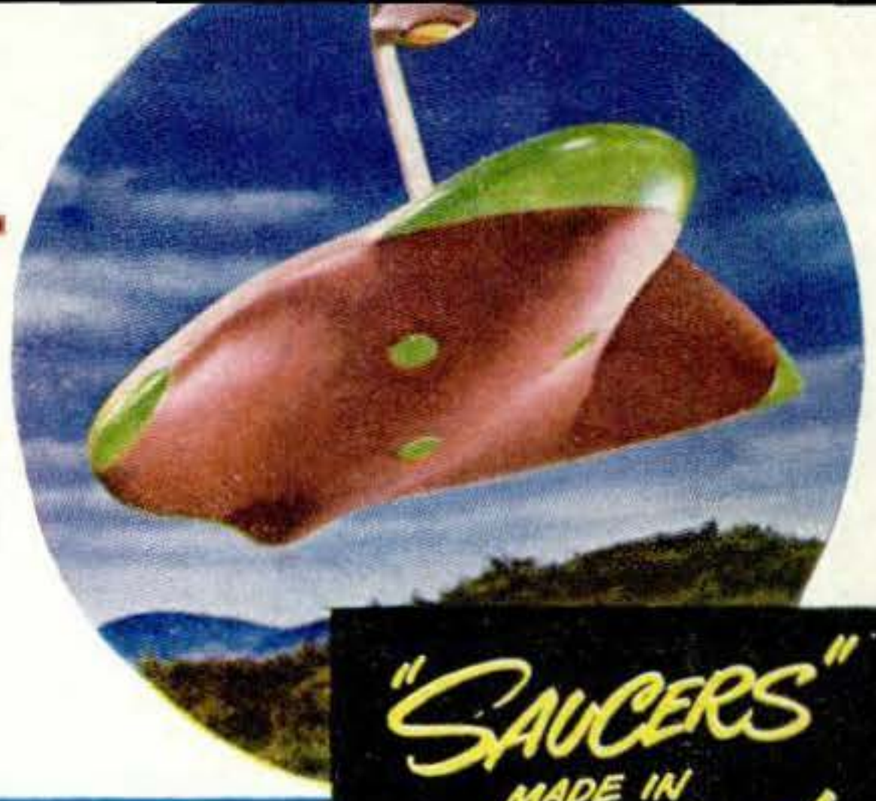
POPULAR SCIENCE

MONTHLY

MECHANICS AND HANDICRAFT



"SAUCERS" MADE IN Hollywood

PAGE 132

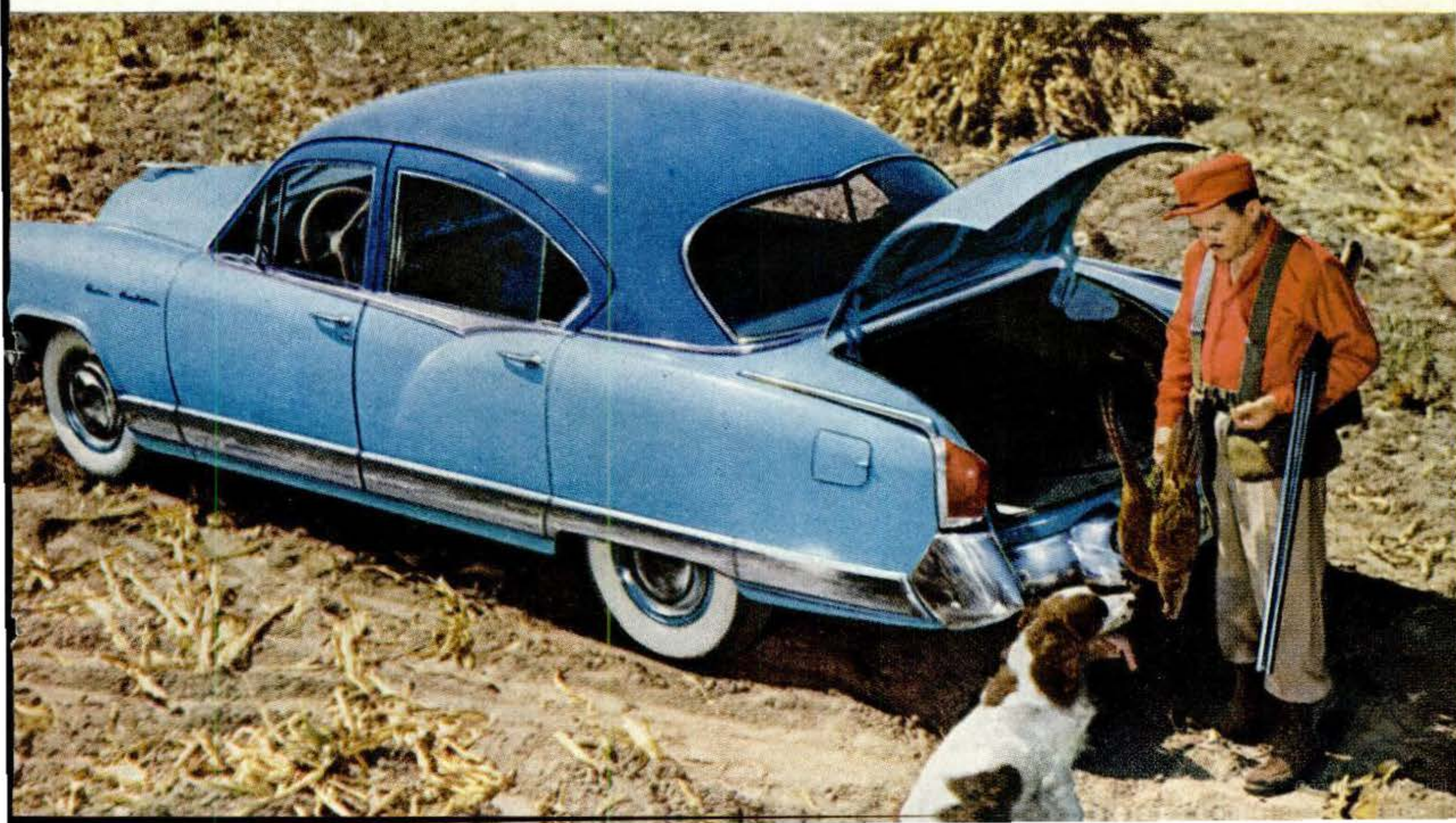
25¢

November

WILBUR SHAW REPORTS FROM THE DRIVER'S SEAT ON

1953 Dodge and Kaiser

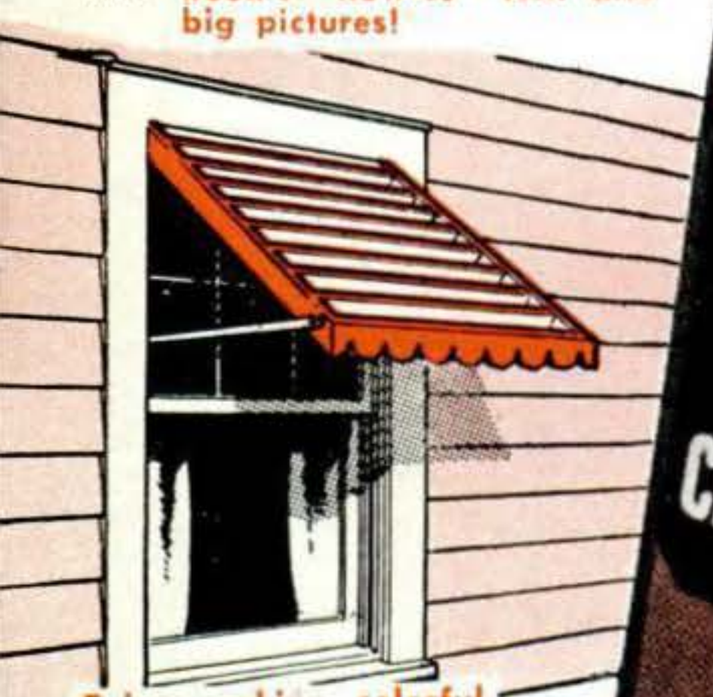
PAGE 120



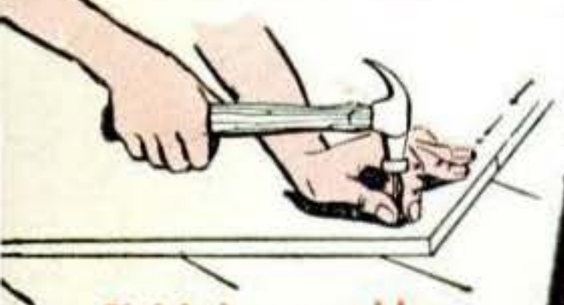
all You Want to Know

Covers All Basic Details to Help Amateur Do Any of 1,001 Jobs — from Making a Storm Window to a Whole New Wing!

Your house can GROW! It's really simple to add new wing, car-port, garage with book's "how-to" text and big pictures!



Enjoy making colorful louvered awnings. Add beauty to windows, porch and doorways.

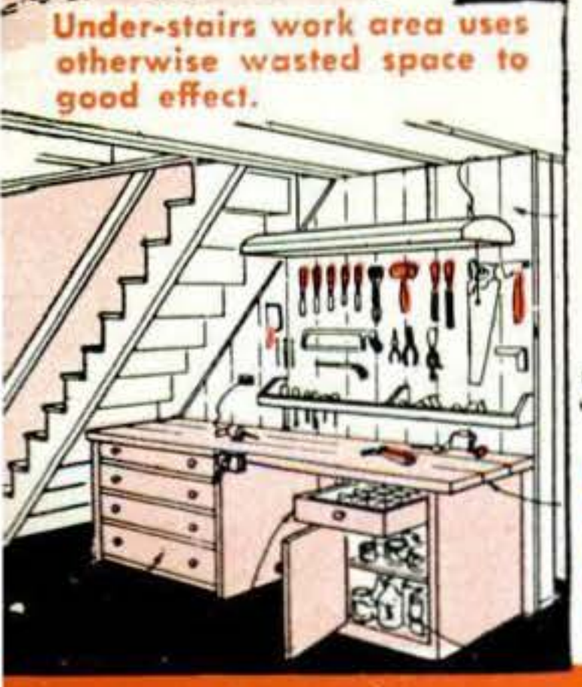


Finish hammer blows with handle parallel to nail head.

Hold drill straight to avoid breaking bits.

NOTHING PAYS the family man such high dividends and satisfaction as a sound working knowledge of "BASIC HOME CARPENTRY." Here it is — from A to Z! Everything you want to know to SAVE today's high labor costs on 1,001 carpentry jobs a man likes to do around his home.

Whether your wife wants a Clothes Pin Box, a Storm Window, or Wall Closet — whether you want an extra Bedroom, a Garage, an Attic Apartment, a whole New Wing on your home — here are all the basic "how-to" instructions, with over 500 pictures and diagrams you need to do an A-1 job in which you'll take lifelong pride.



Under-stairs work area uses otherwise wasted space to good effect.

Learn professional way to hang doors. How to convert old-fashioned paneled door to modern flush type by covering with plywood.

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Repair, Replace Broken Molding
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How to File Saws, Sharpen Chisels, Files; Types and Uses
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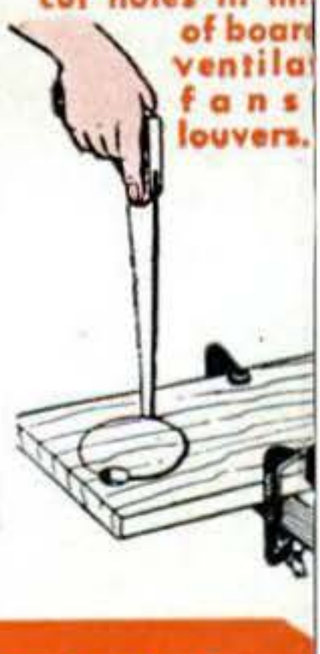

Learn right way to cut holes in middle of boards for ventilating fans and louvers.

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about BASIC HOME CARPENTRY

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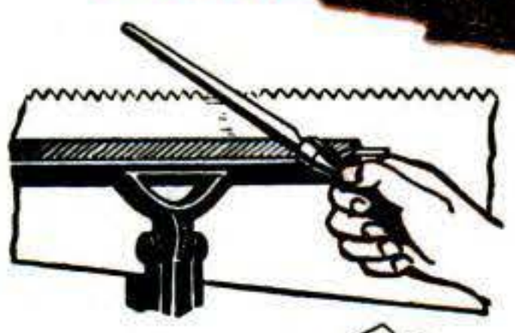
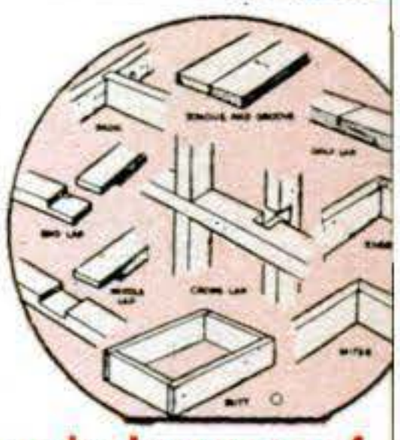
Open up wall between two rooms for feeling of spaciousness. Book shows how to do it without sacrificing structural Strength.



Save dollars keeping all tools clean and sharp with book's directions.

Learn simple way to plane true square edges with book's 1-2-3 directions.



Learn how to make best type of wood joint for every job from building box to house framing.

Marking gauge helps plane bevel or chisel a mortise accurately.

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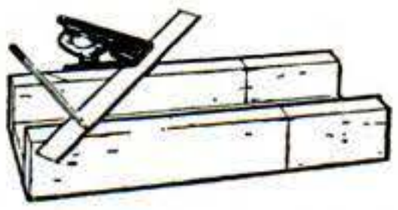

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Founded 1872, Vol. 161: No. 5

Mechanics and Handicraft

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NOVEMBER, 1952

THE Latest Atomic News

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What makes the girl fly? For the answer—and for other secrets behind the spectacular stunts you will see in this year's new ice pageant—turn to the six-page picture story of "The Flashiest Show on Earth," beginning on page 138.

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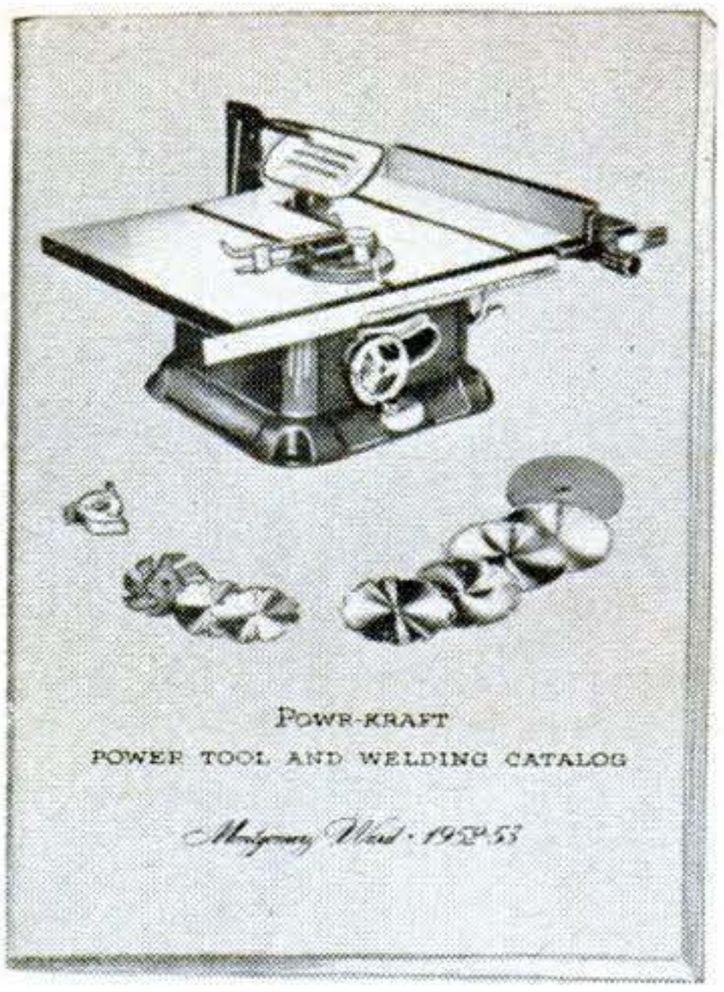

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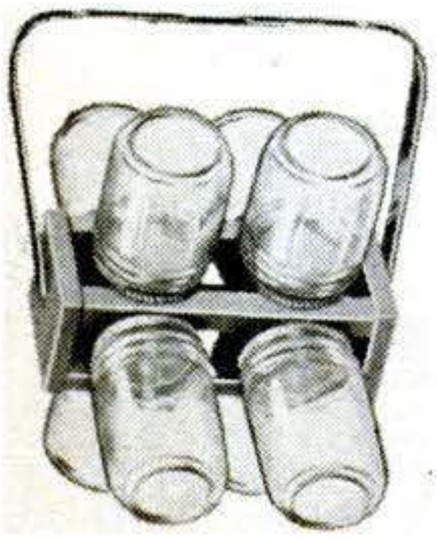

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Learn the Hot-Rod Lingo

When the boys begin to gab about their alky-fed steeds, do you wonder what they're talking about? Then be sure to buy the next issue to learn the lingo from the Hot-Rod Dictionary, which will be part of the December issue of POPULAR SCIENCE MONTHLY. It's something every well posted auto fan will want to save.

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Assistant Operator

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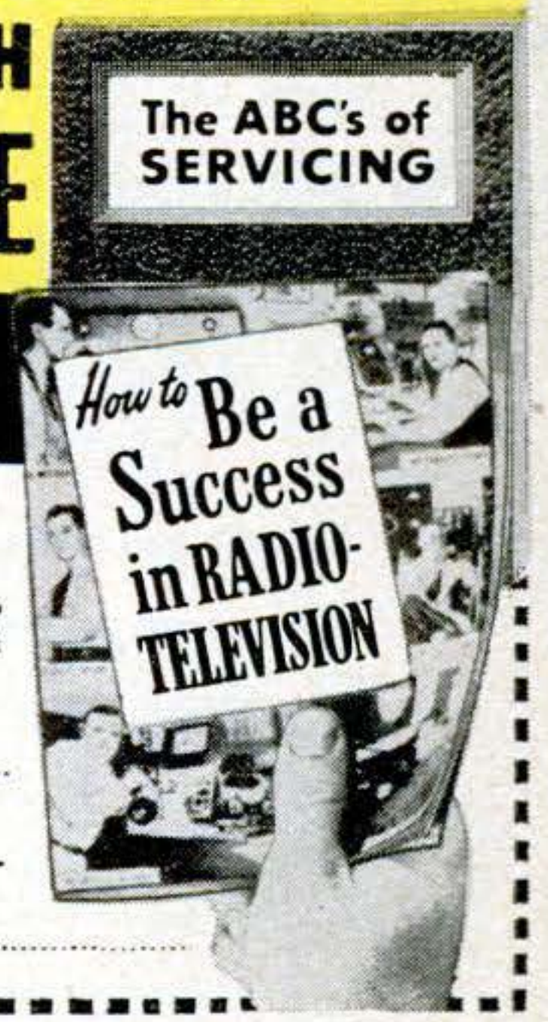

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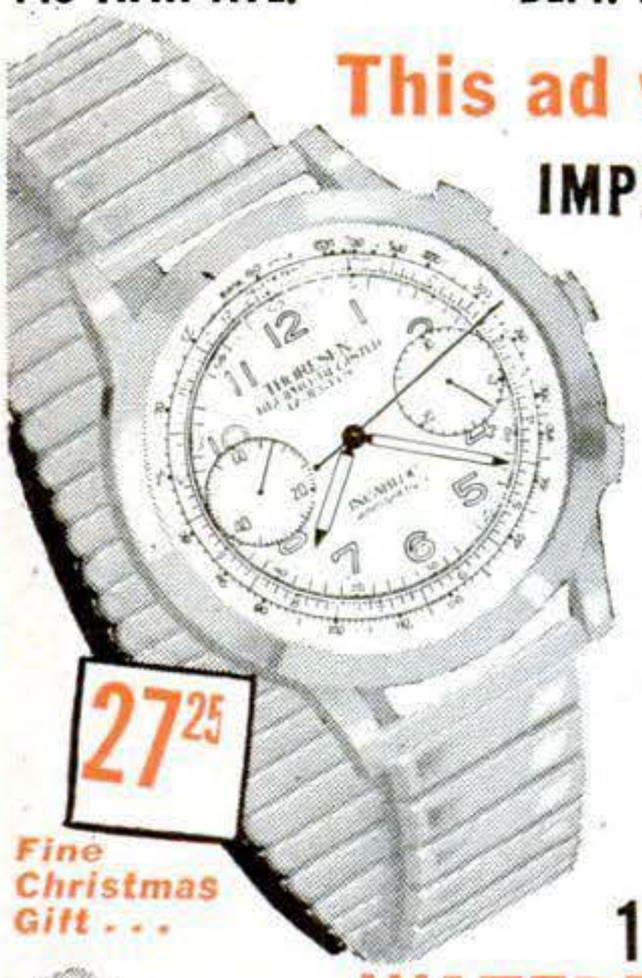

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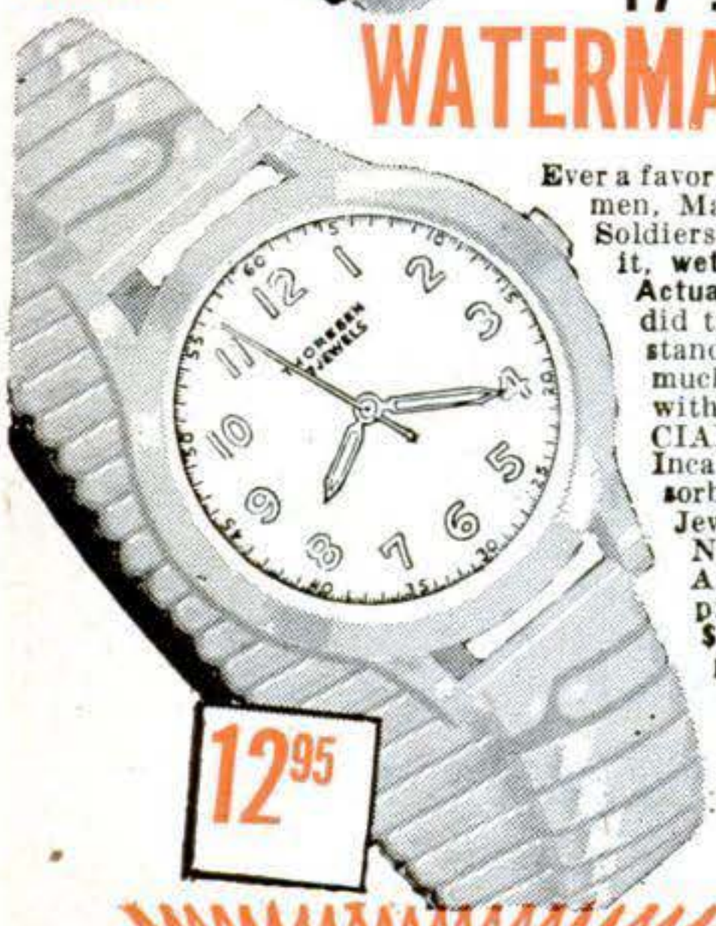

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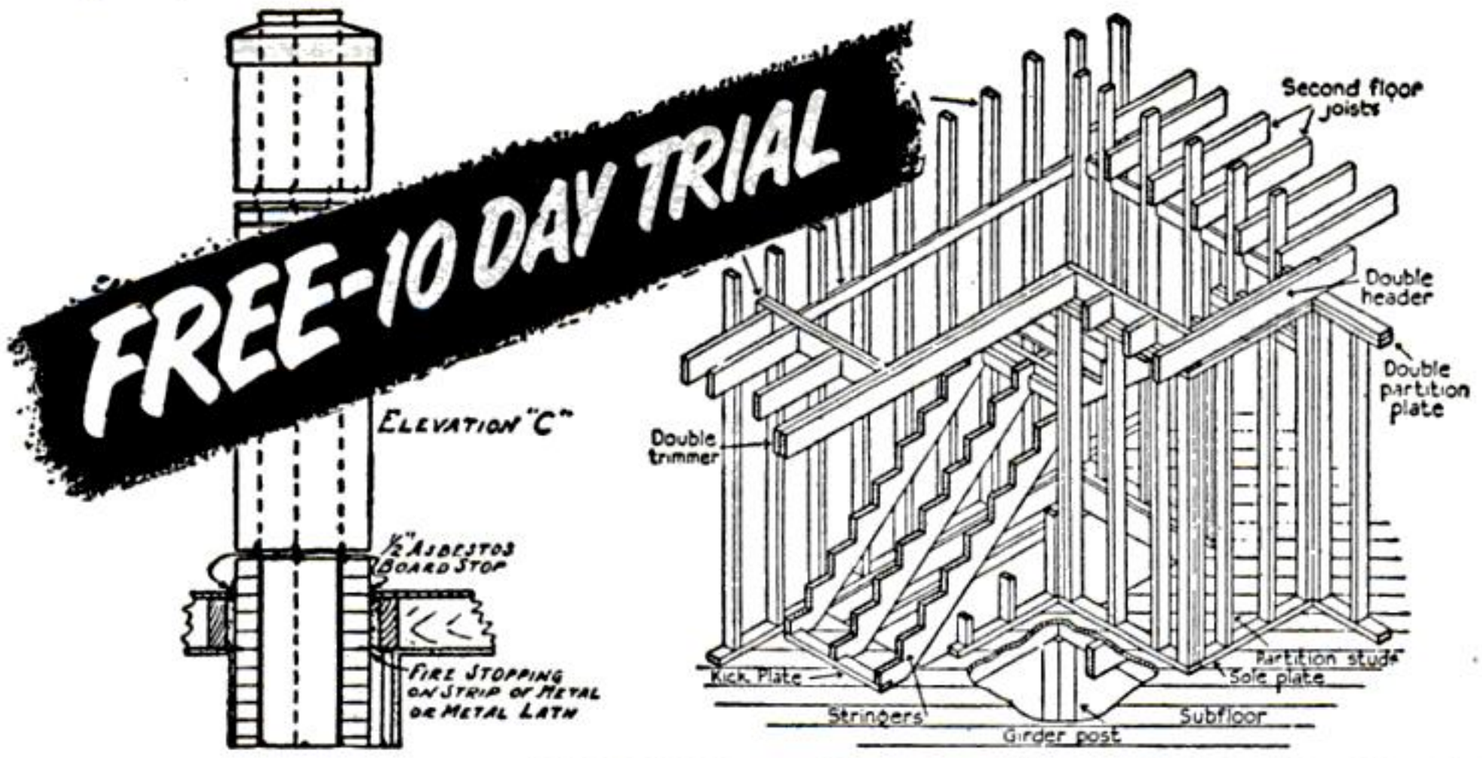

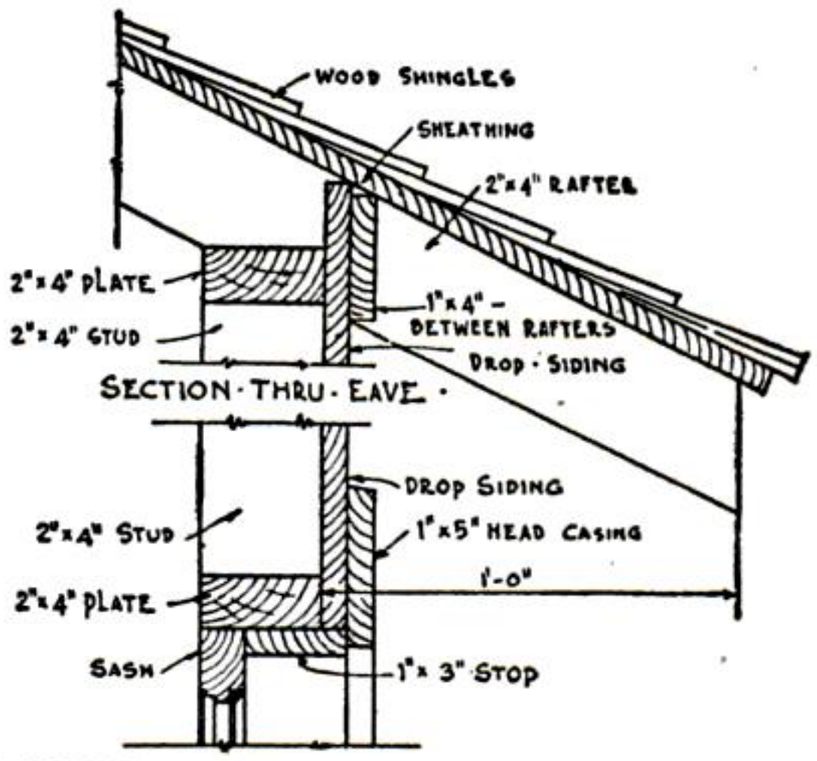

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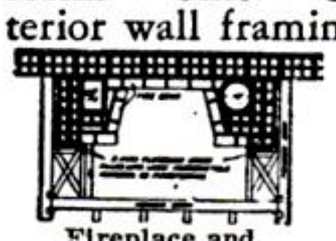
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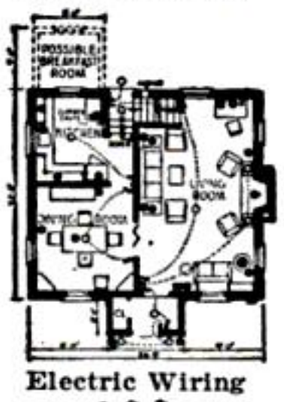
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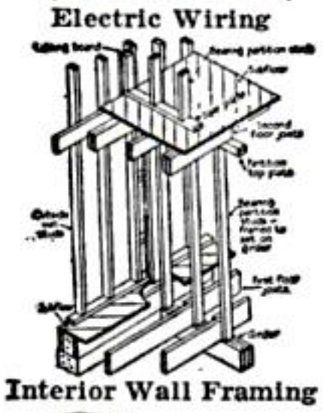
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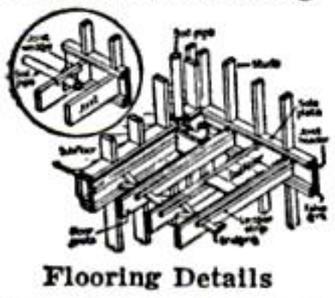
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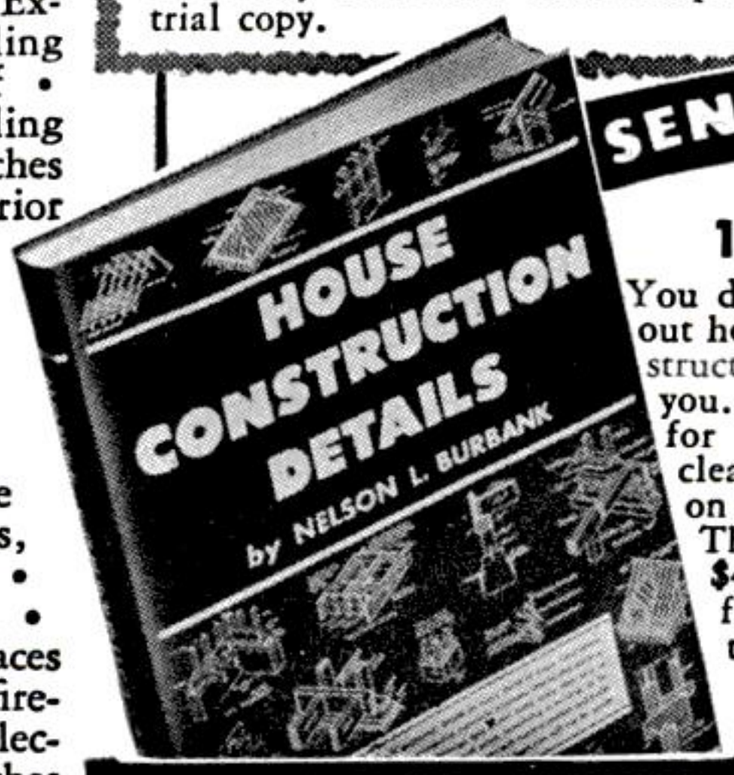

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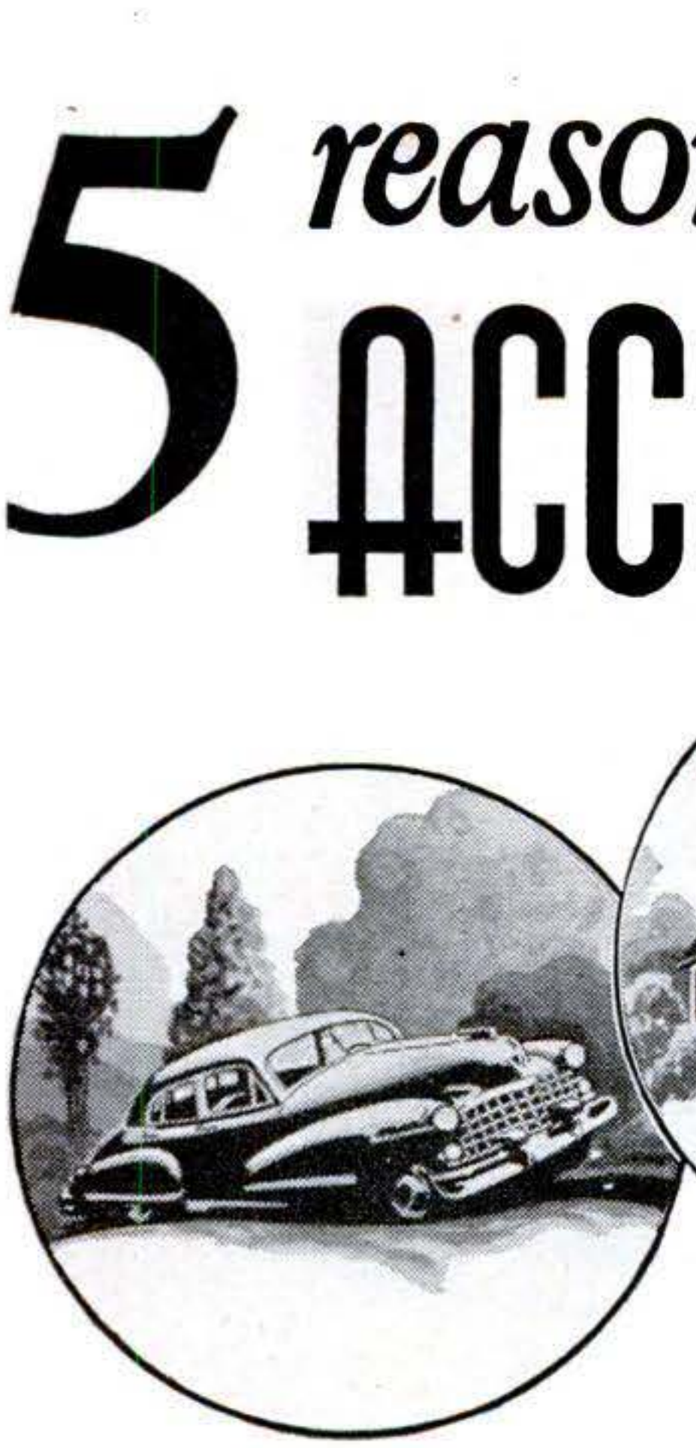

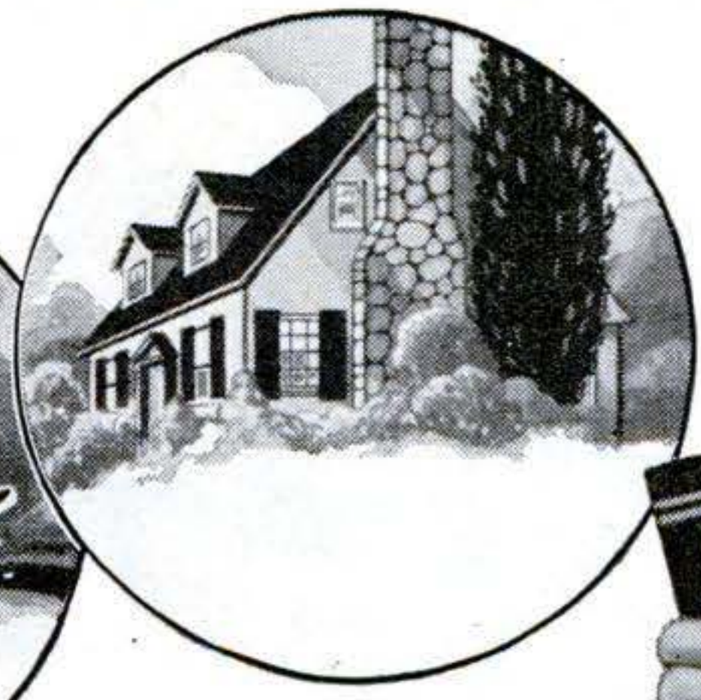

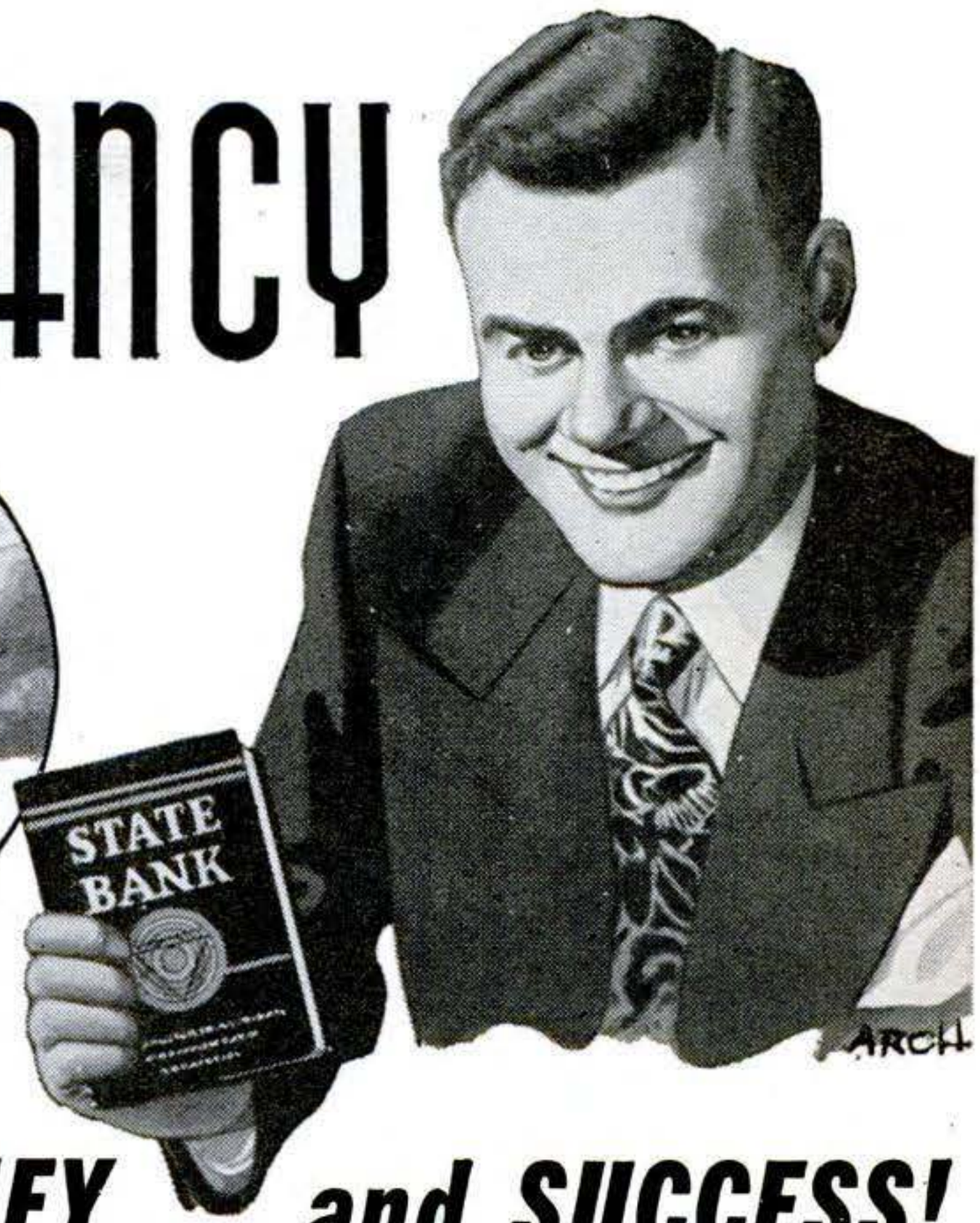

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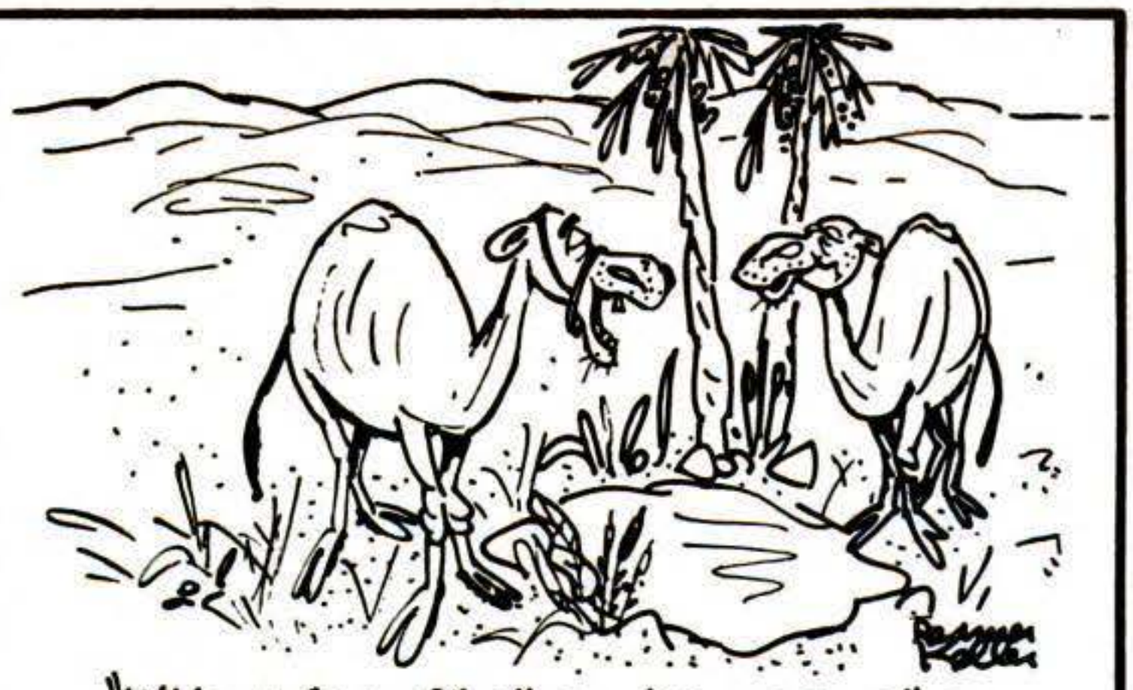

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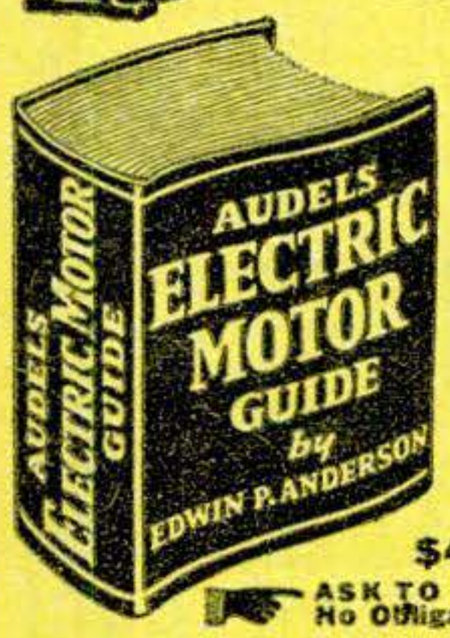

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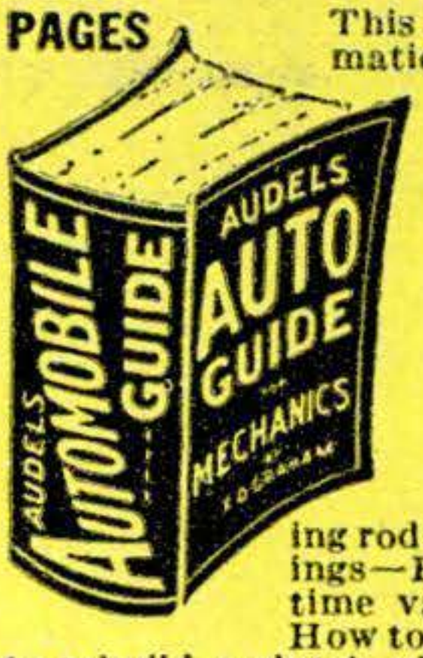

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Letters—

The Last Model T to Make It

You're right that Model T Fords have been restricted from the Mt. Washington toll road because of the steep descent ["Letters," Sept. '52, p. 12], but not for the past 40 years—only a mere 27.

In 1925, a Model T touring car was driven to the peak and then delayed a while coming down by a broken axle. Repairs were made on the spot—one and a half miles below the summit—and the car brought down without further incident.

It was the last Model T, however, to be allowed up the mountain. I know, because I was the driver.

CARLETON G. OSGOOD, Bristol, N.H.

Dizzier Definitions

I liked your Dizzy Definitions on page 164 of the August issue.

Here are three of my own:

Overhauls—what mechanics wear.

Fuel—careless driver.

Overcharged—60¢ a gallon.

RON BULLEN, Forest View, Alberta.

More on Train Photos

I agree with Mr. Kelso as to his methods of shooting rail pictures [Aug. '52, p. 190].

I use the sun shade as he does along with a haze filter that helps greatly in bringing out a darker sky.

In rail photography, one has to take it as it comes, for trains in action do not pose for you.

J. L. WATSON, Los Angeles.

Why Batteries Blow Up

Could you tell me what would cause a car battery to explode? It happened just after one of our mechanics shut off the engine and started to make a repair. The mechanic said he noticed one of the cell caps was missing and that the acid boiled slightly while he was idling the engine.

WILLIAM J. DUGAN, Morris Plains, N. J.

Highly explosive hydrogen is formed while a battery is being charged. That's why open flames are barred from the charging room in any good shop. In your case, a spark or lighted cigarette might have set off the explosive gas.

Plane Talk

In your table on page 127 of the August issue where you compare the specifications of the modern Piper Pacer with those of the old Piper Cub, I looked in vain for the comparison that every "Sunday pilot" like myself longs to see—some figures on what the light-plane industry is doing to bring down the cost of week-end flying.

The cost of flying time in the average light aircraft has more than doubled since before the war. My salary has not doubled.

The thousands upon thousands who soloed under the GI Bill have been forgotten. They aren't flying simply because they can't afford to. Yet the industry is more interested in building four-place aircraft for people of means than in building cheaper two-place jobs for people like me.

Instead of bragging about how much bigger and better and faster and heavier and more expensive aircraft are today, I'd like to see them build a modern Cub for less money and less operating expense than the old model.

LESLEY N. FORDEN, Alameda, Calif.

No Tricks

Those scientists who float brass, tin, or molybdenum between two magnetic coils must have a black thread up their sleeves [PSM, Aug. '52, p. 108]. Around my way

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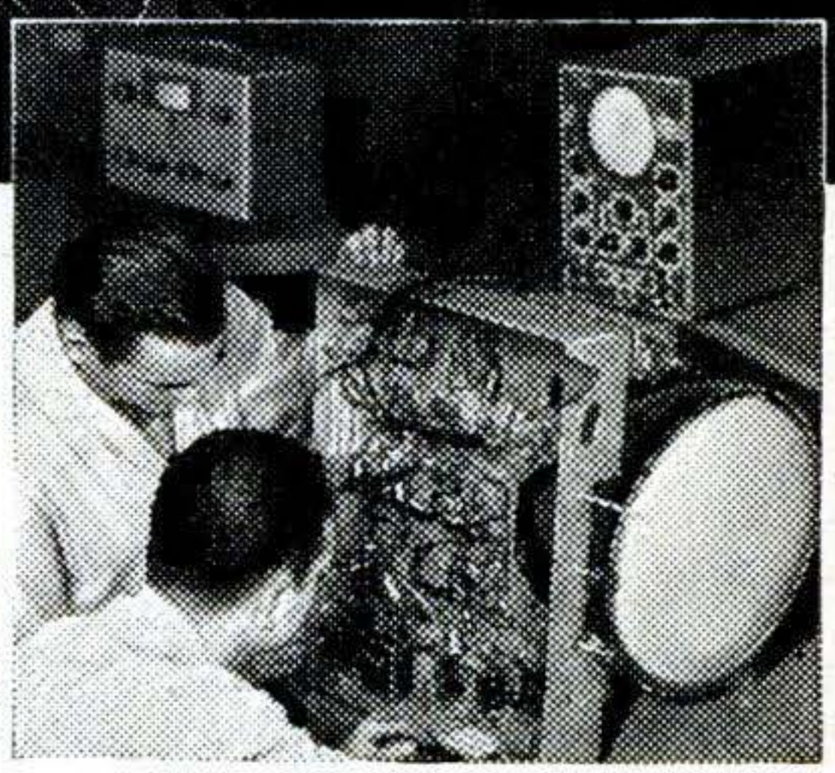

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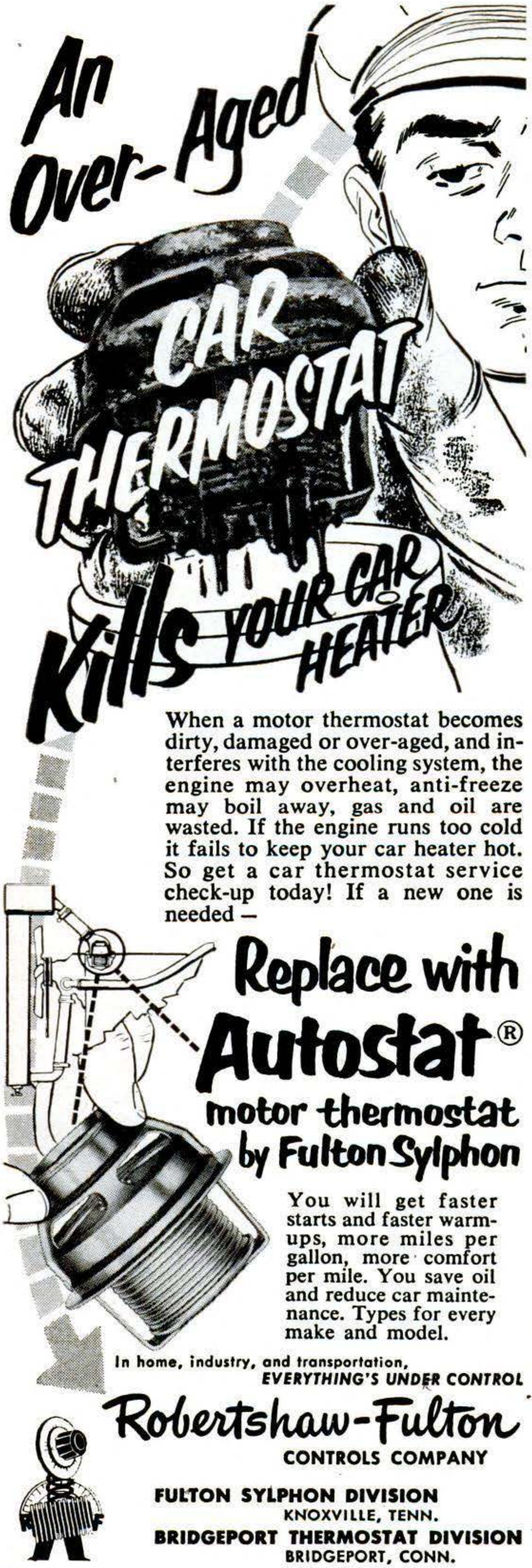
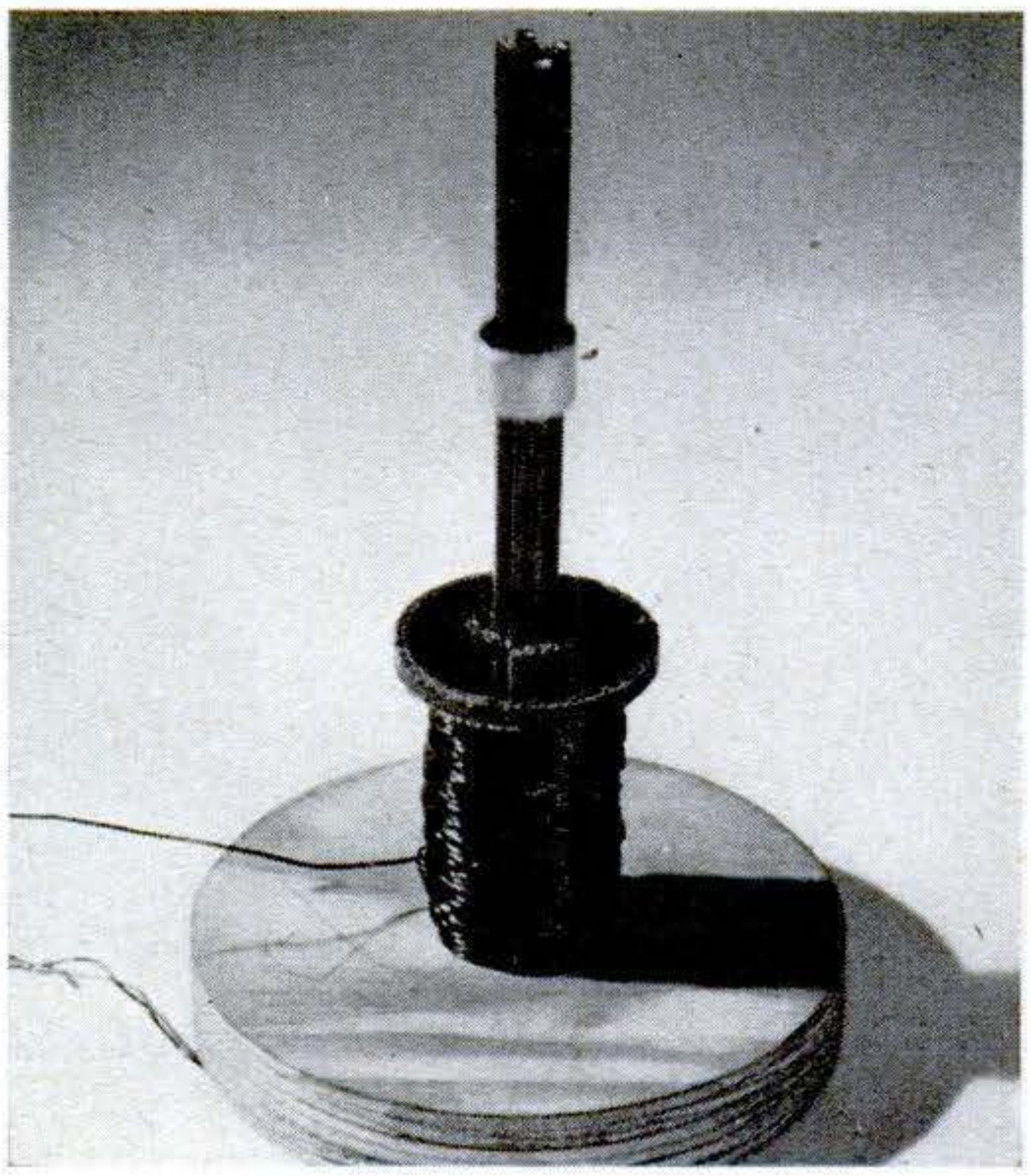


the only metals you can attract with magnets are iron and steel. Who's kidding?

HAROLD DEVERS, Minneapolis.

The metal is not attracted, but repelled. The 10,000-cycle magnetic field induces currents in it as though it were the secondary coil of a transformer. These induced currents in turn create a magnetic field of their own, which opposes that of the coils.



The photo above shows a homemade demonstration of the principle. A bundle of iron wires is wound with a coil hooked to a 60-cycle toy transformer. The aluminum ring is violently repelled and thus floats.

Seeing Is Believing

I have read so many articles lately presuming to explain flying saucers as refracted light, mirages, mental tricks, etc., that I was a bit disappointed in your two articles in the September issue [p. 96 and p. 167].

I passed through the same period of doubt until last February when I got a good look in broad daylight at three saucers flying in formation. What I saw was no trick of the eye, the air or the mind. They were very clear, bright, and flew intelligently.

I am a minister and have three graduate degrees, one in abnormal psychology. I work part time at the Pratt Clinic in Boston as a psychologist. I think I know a brainstorm when I see one. Perhaps Mr. Swezey and Mr. Mulholland are being caught in their own logic—and with their own tricks.

ALBERT C. BALLER, Greenfield, Mass.

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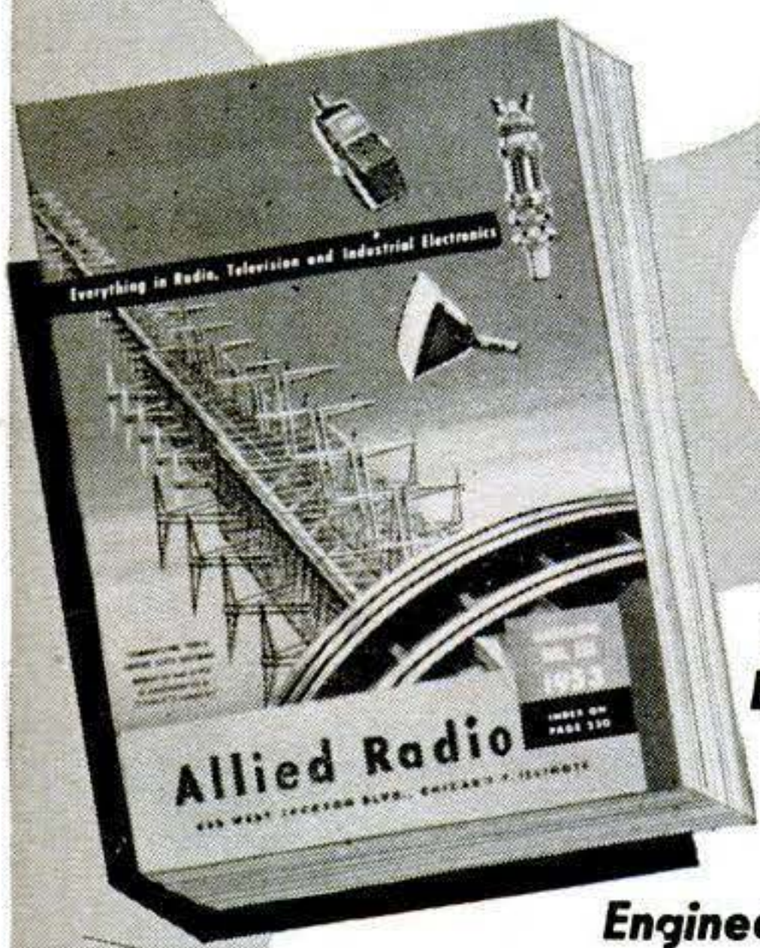

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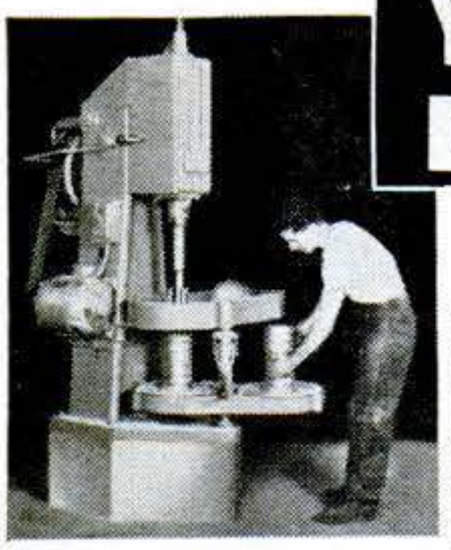

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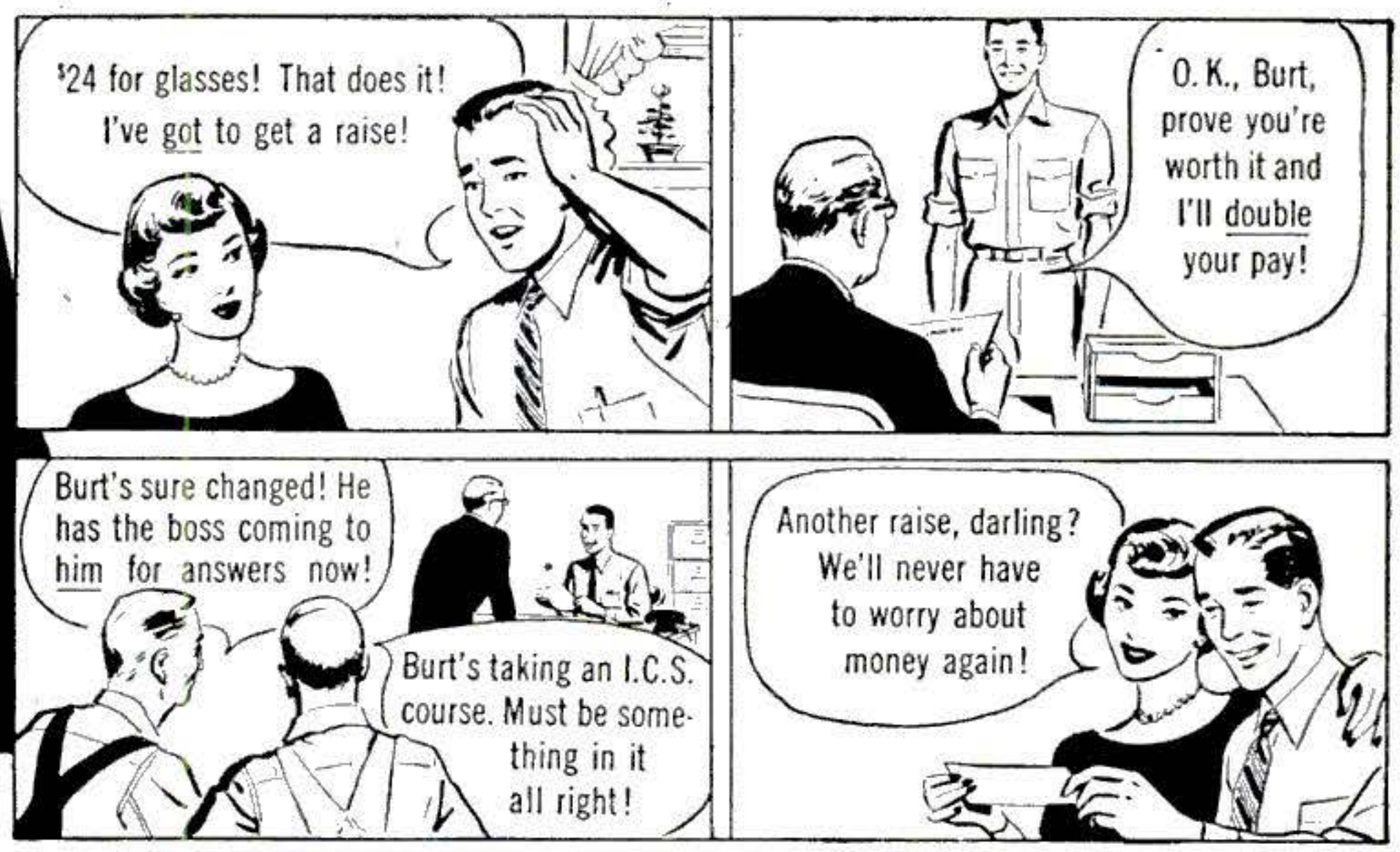

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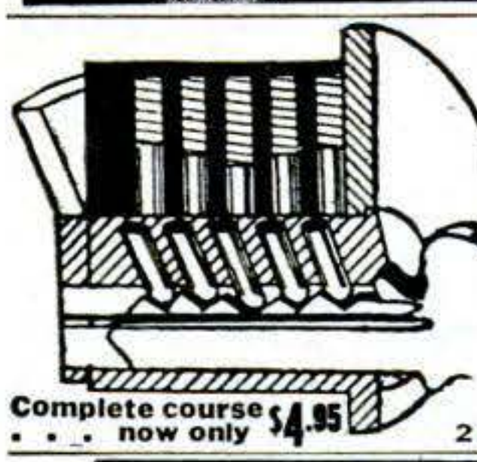

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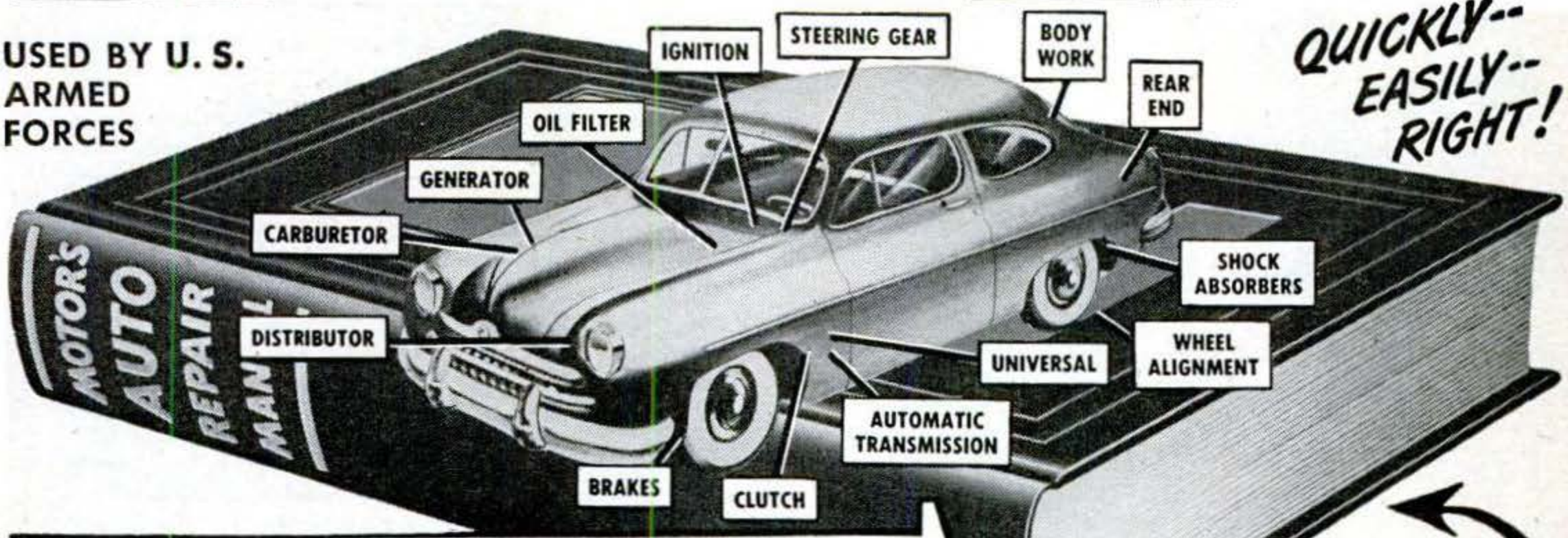

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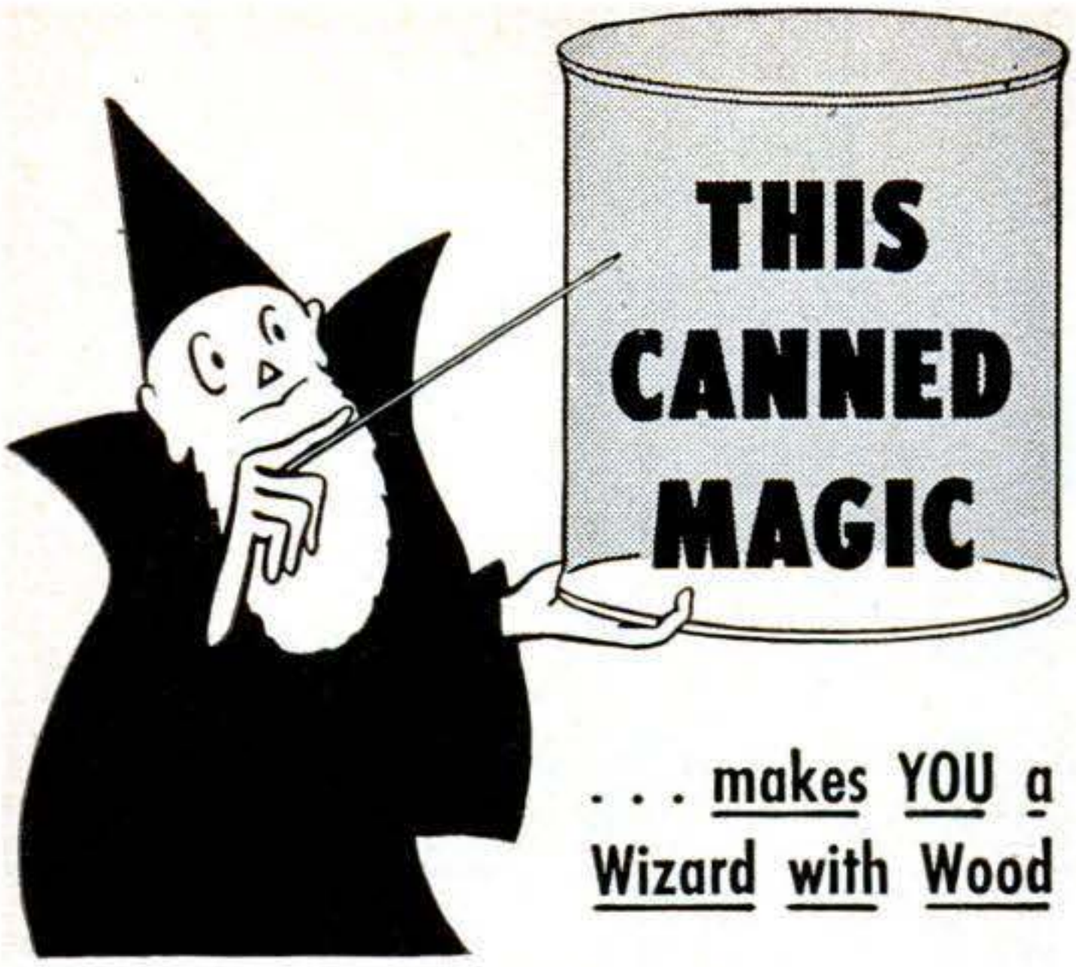

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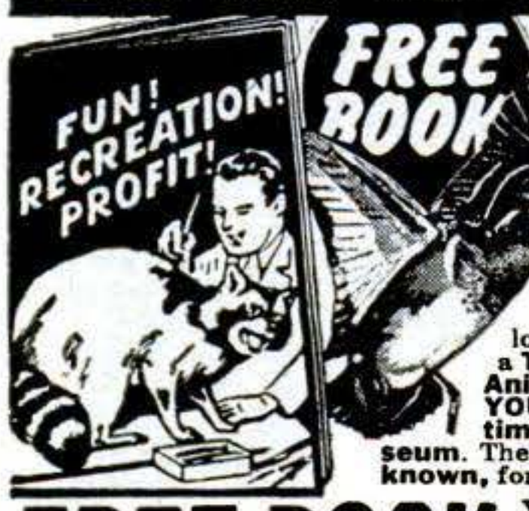

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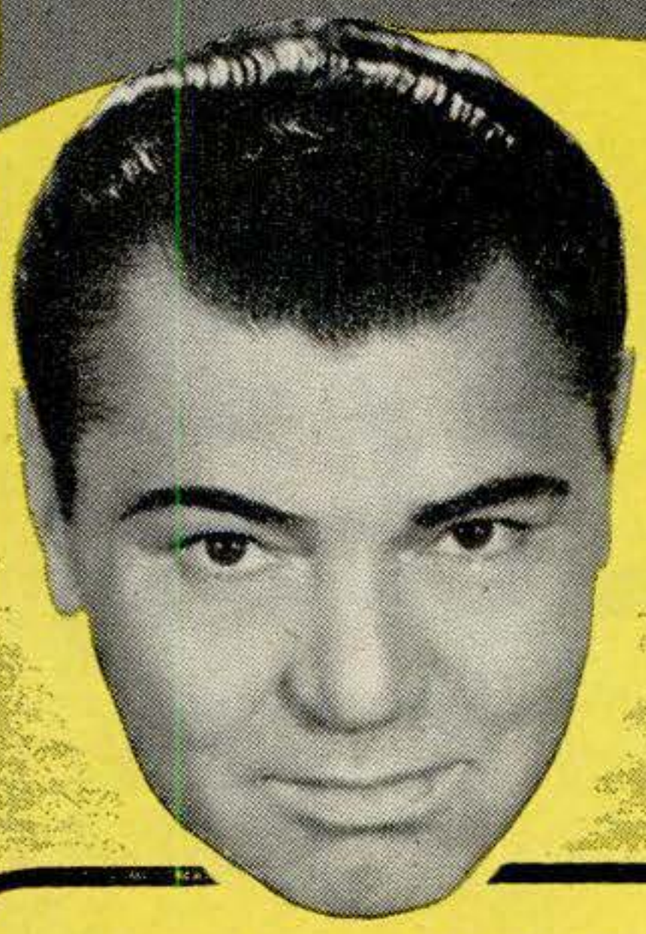

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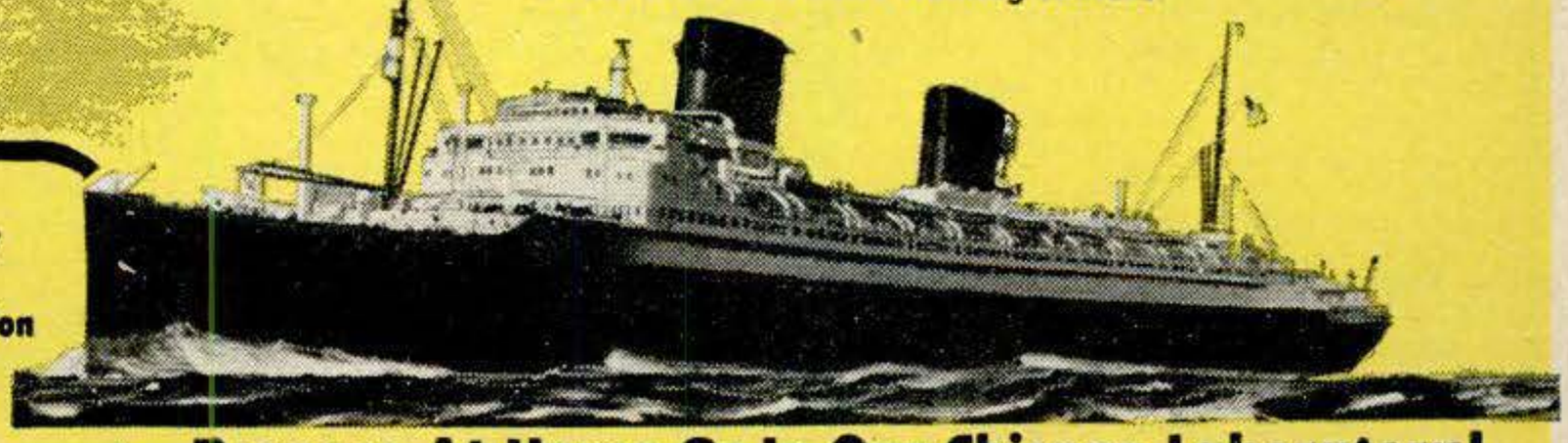

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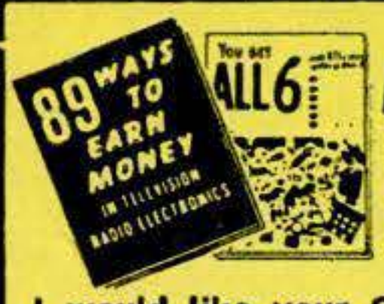

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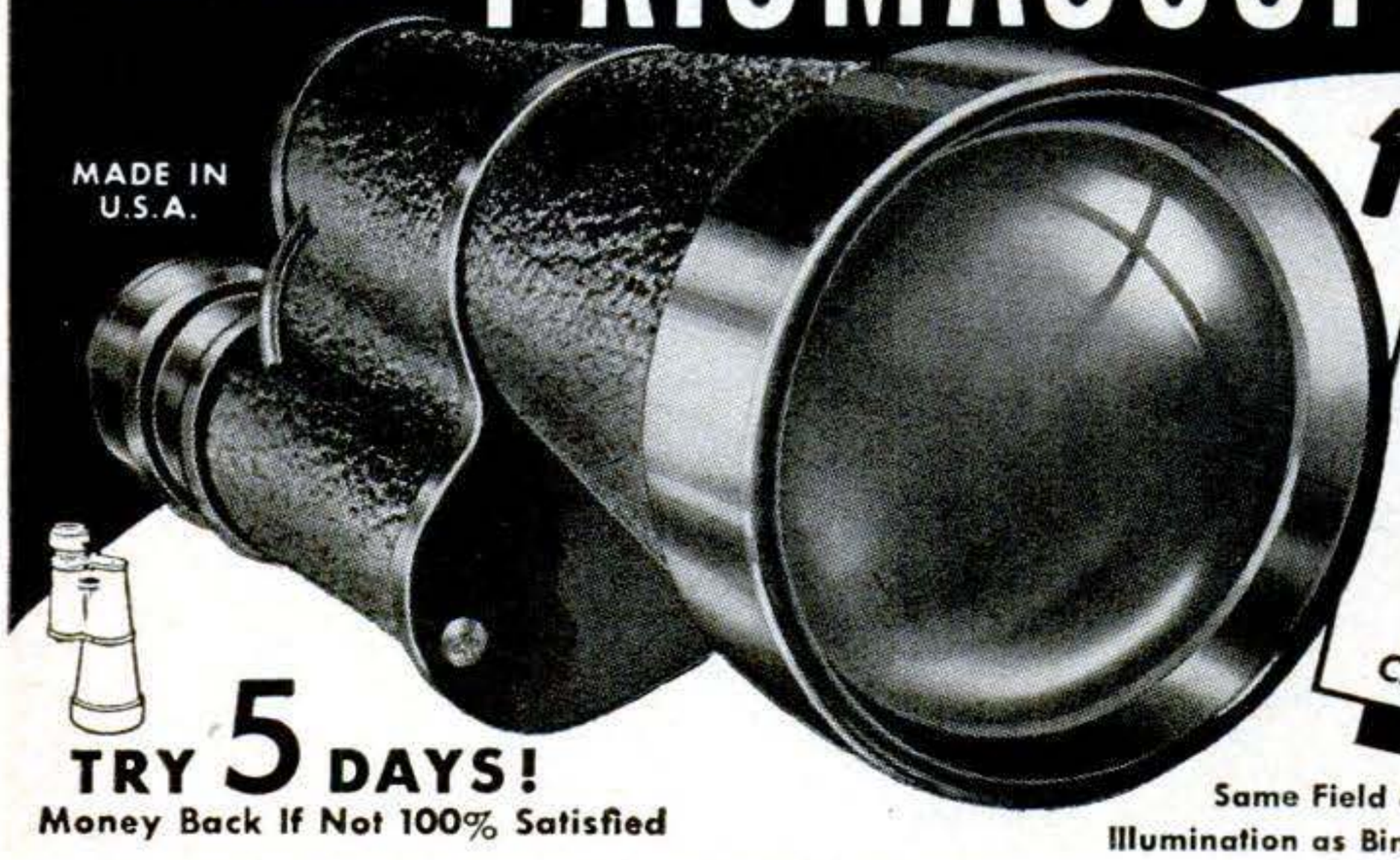

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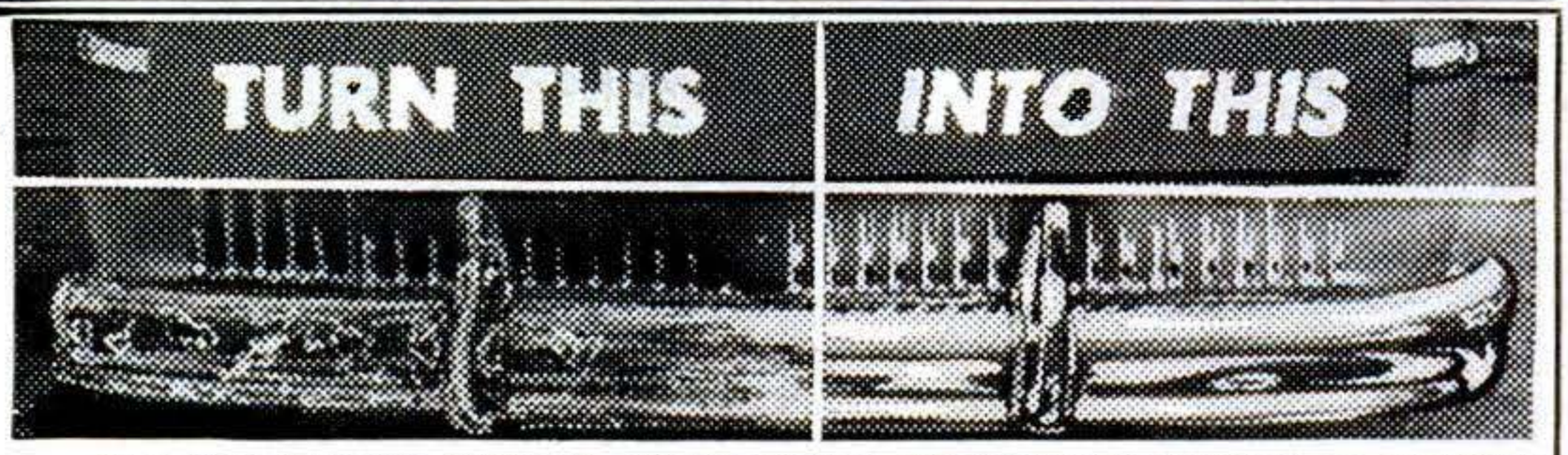

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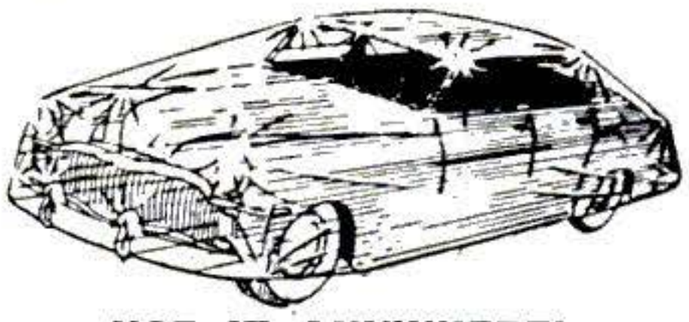

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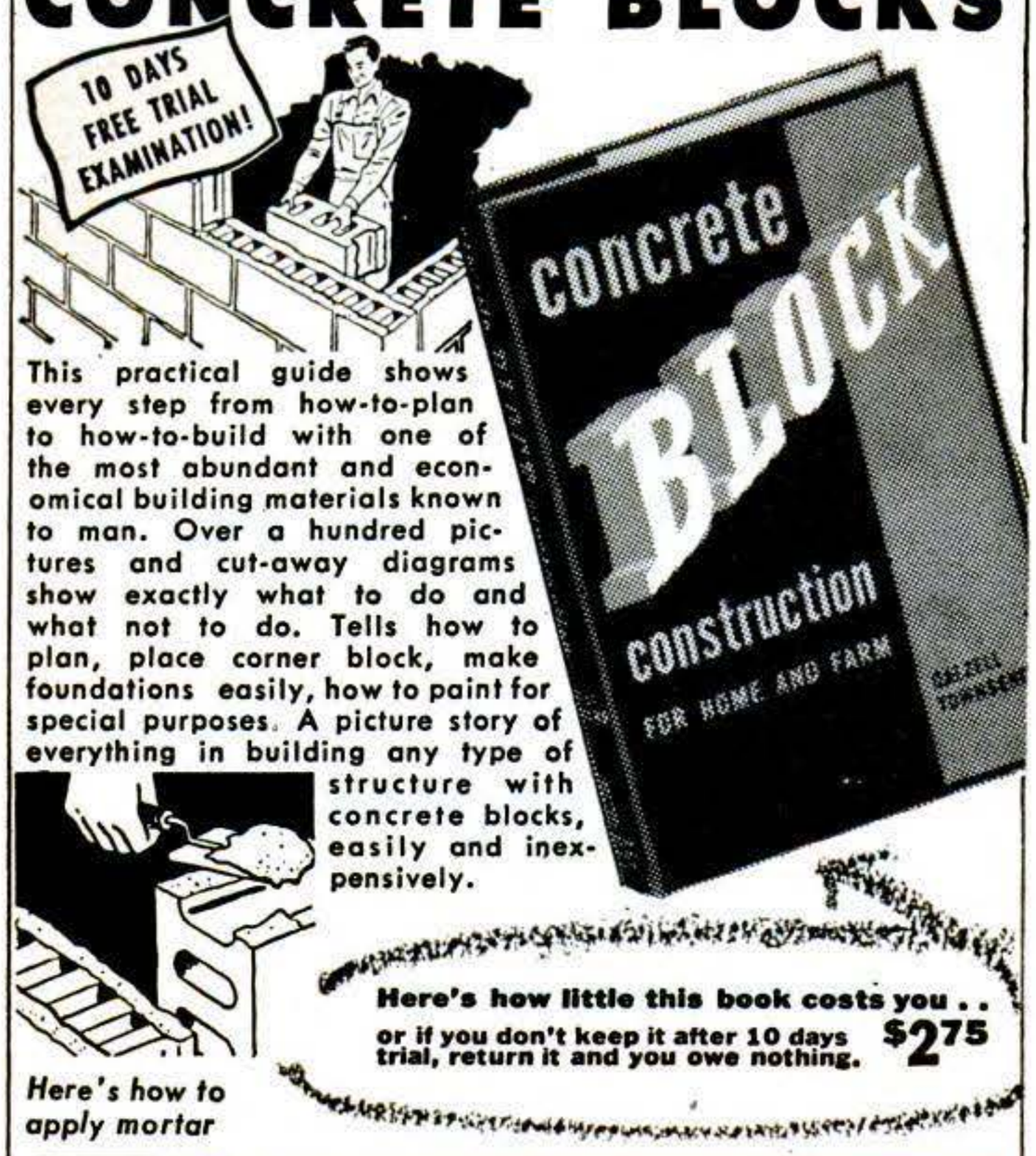

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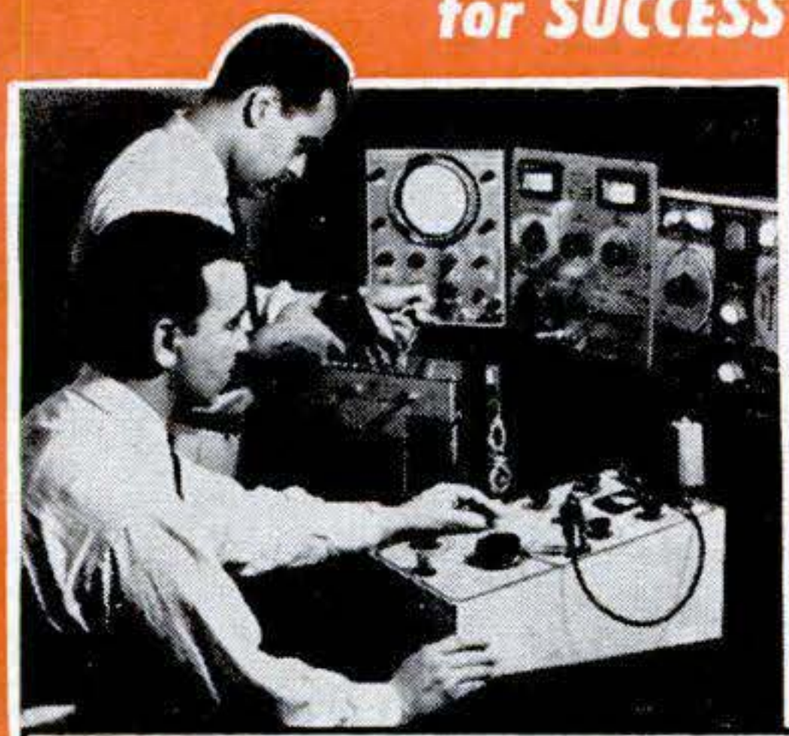

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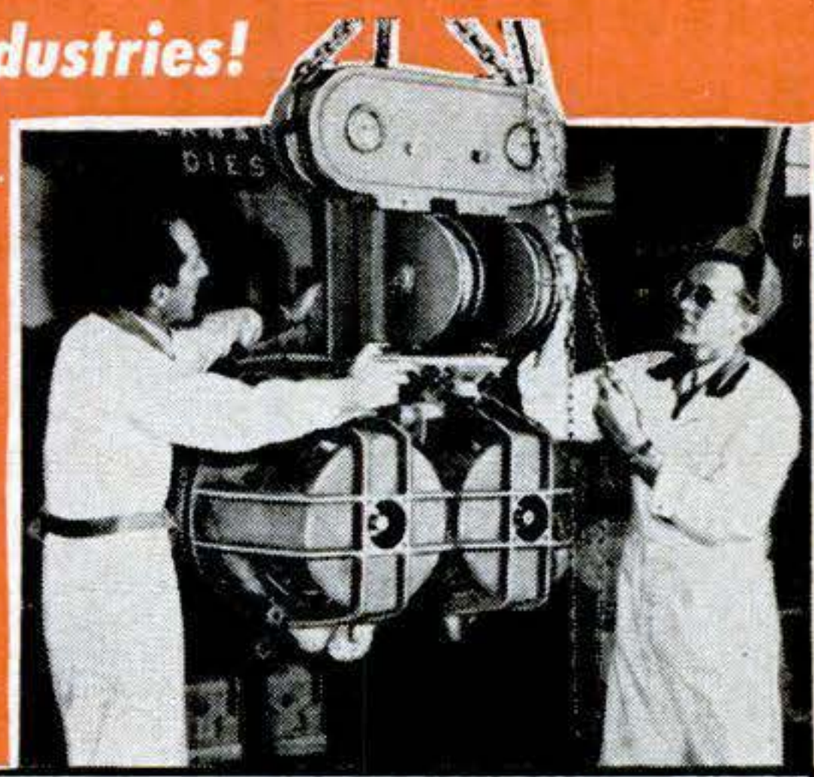

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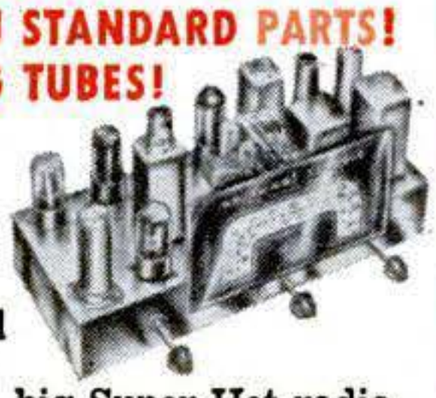

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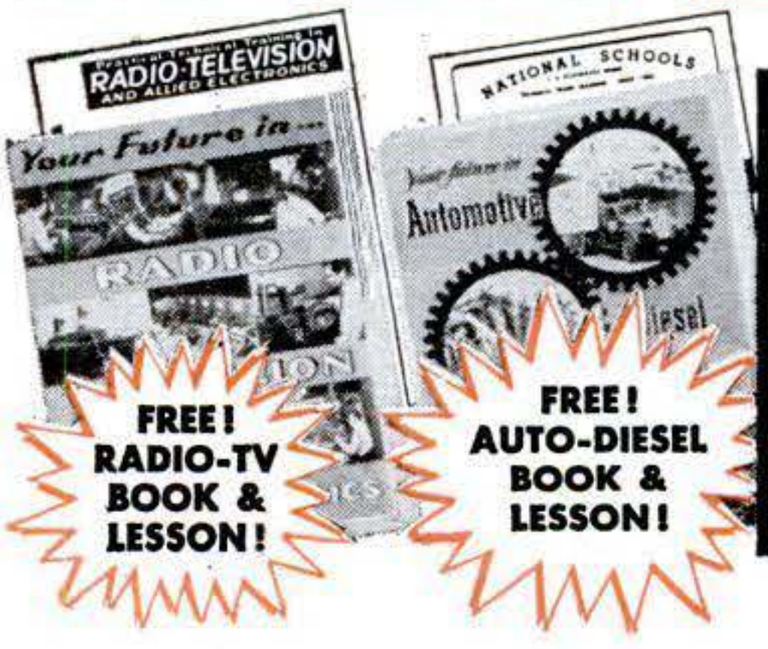

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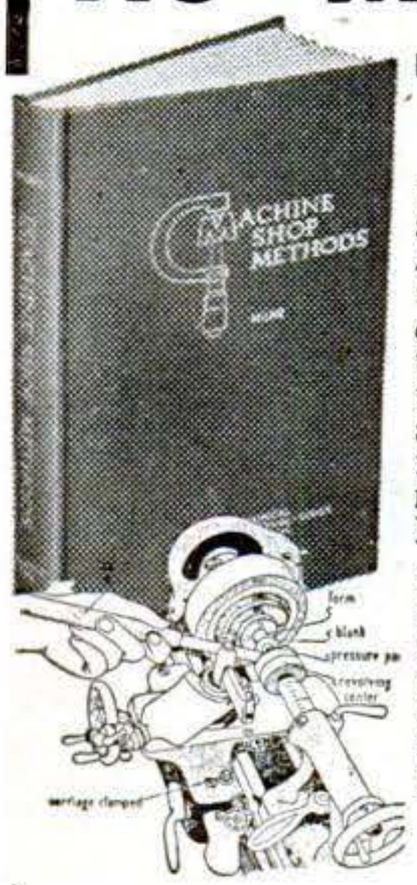

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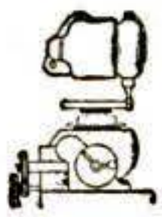

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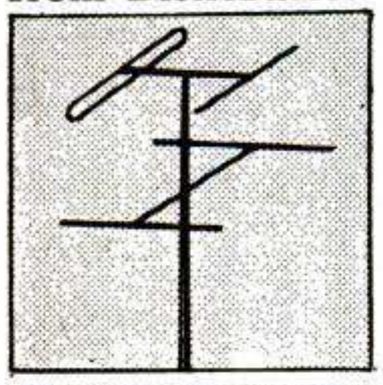

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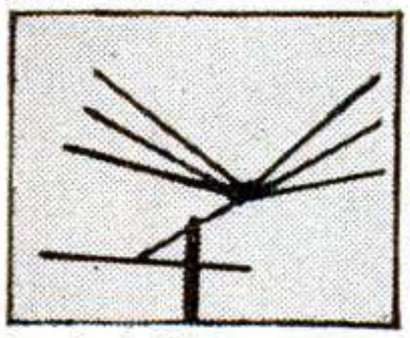

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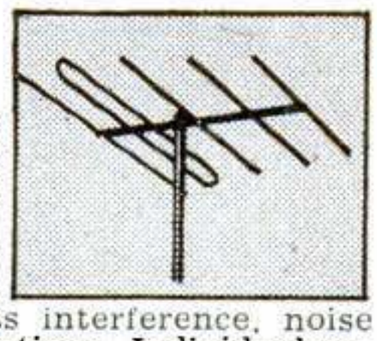

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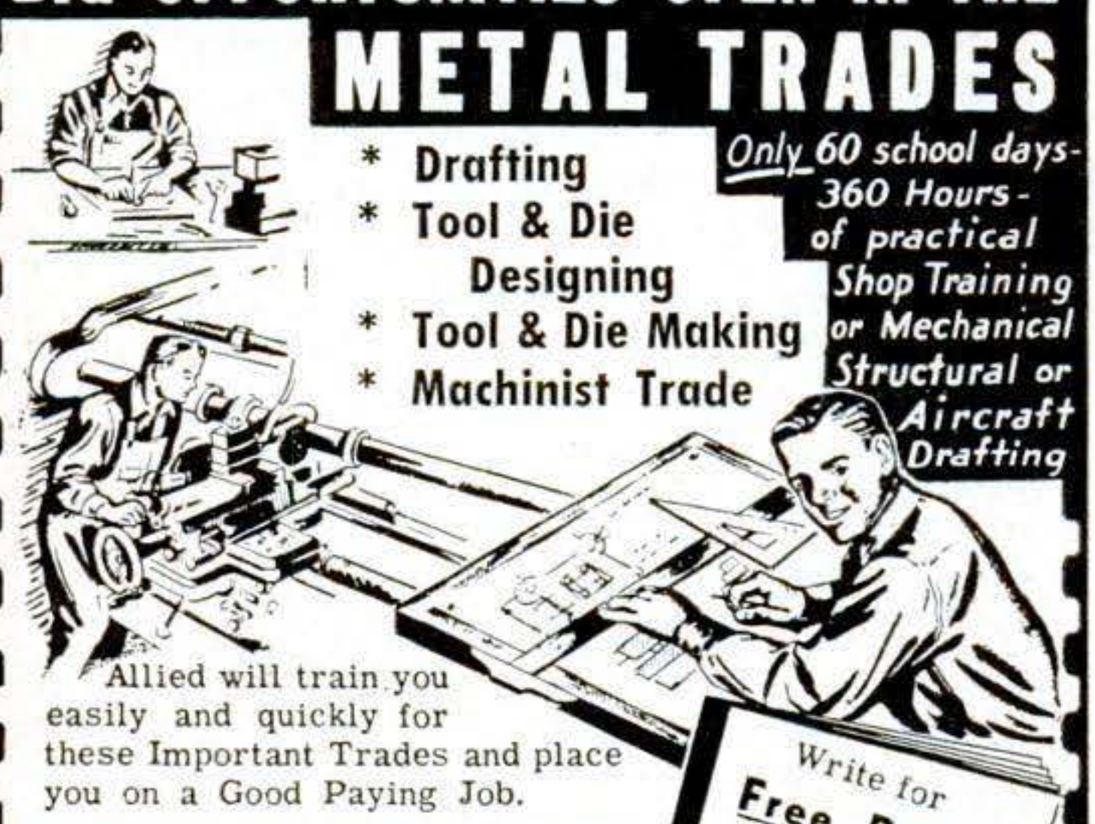

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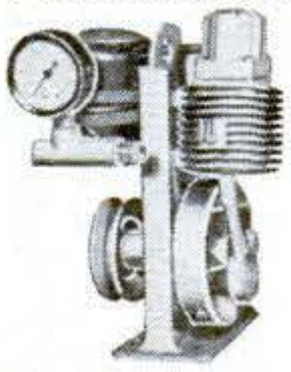

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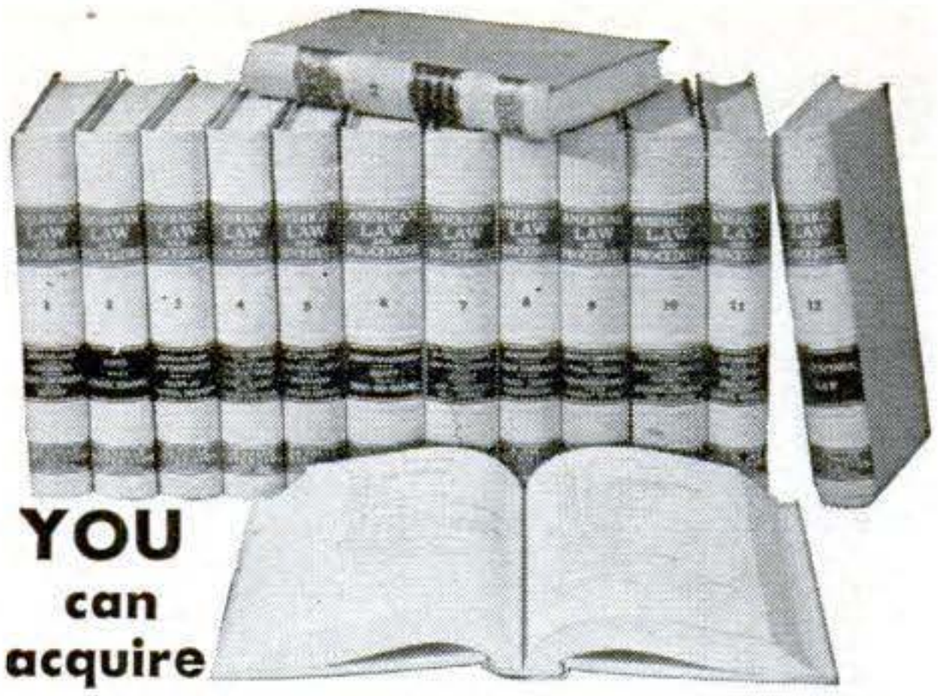

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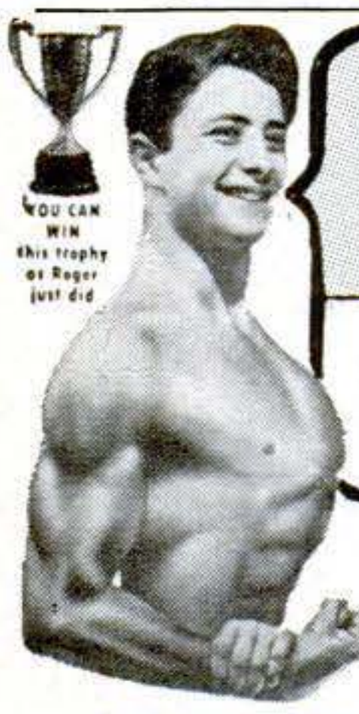

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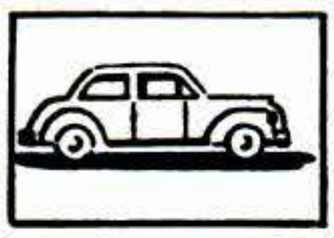

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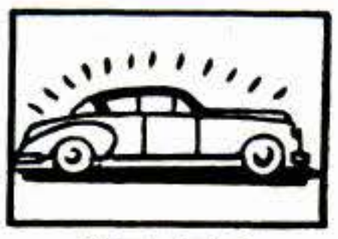

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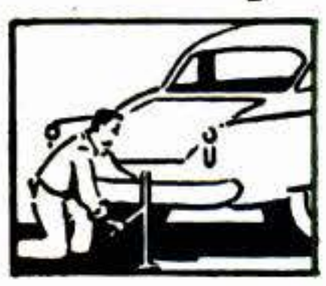

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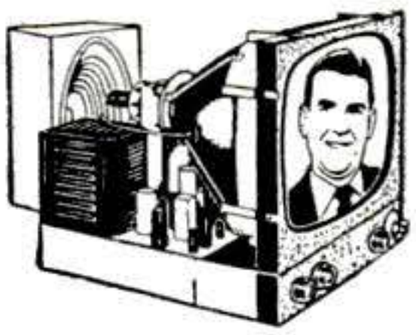

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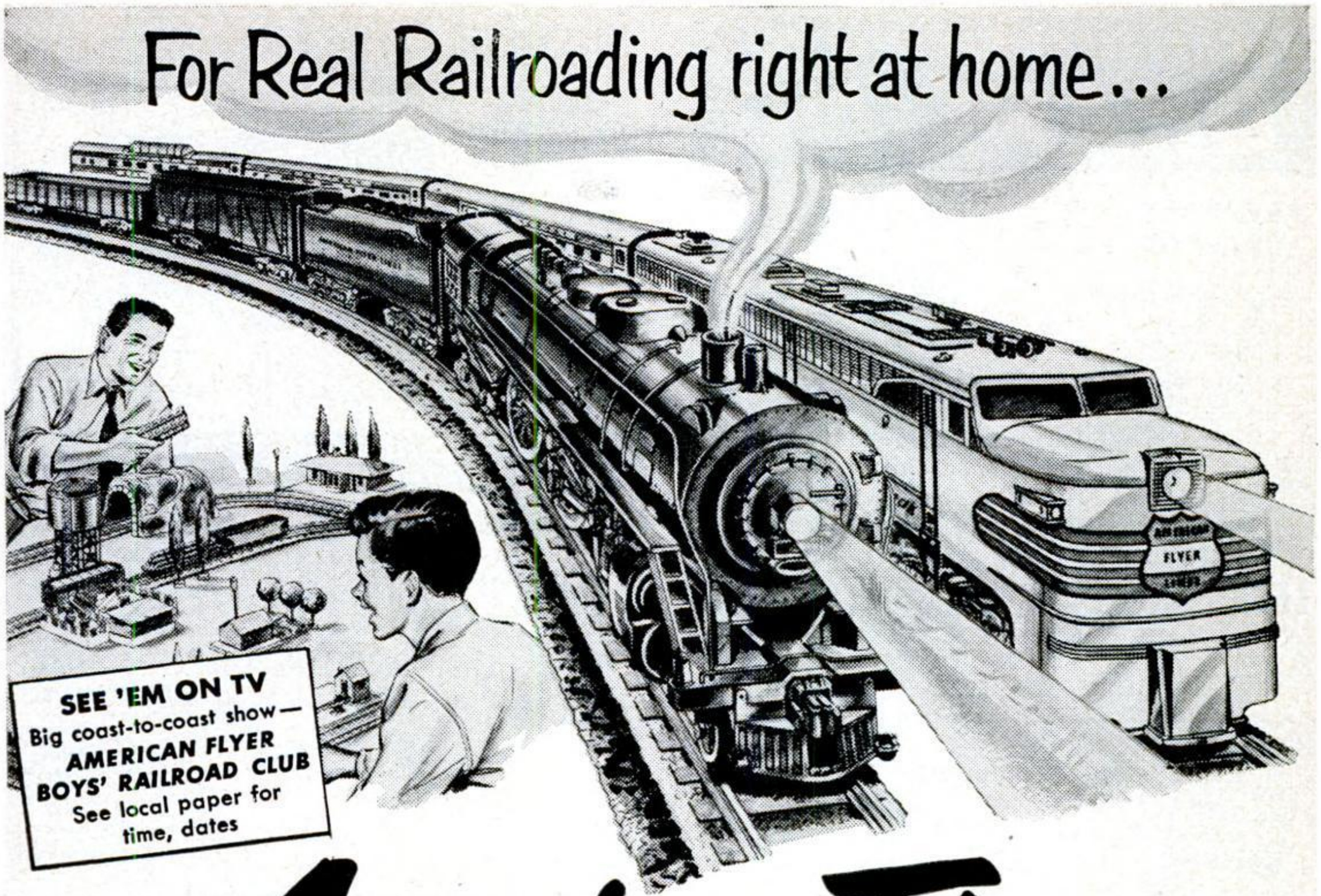

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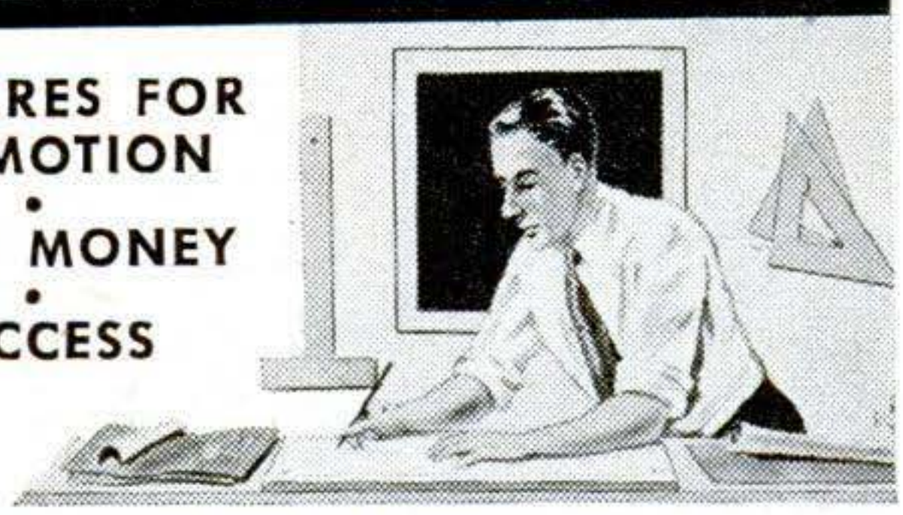

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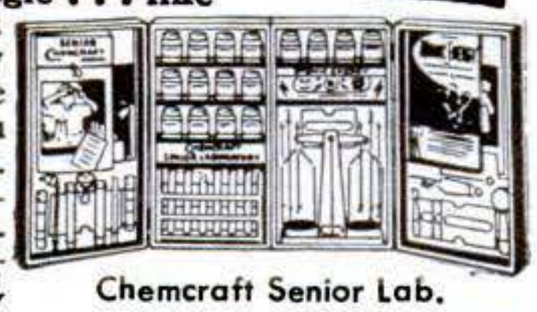

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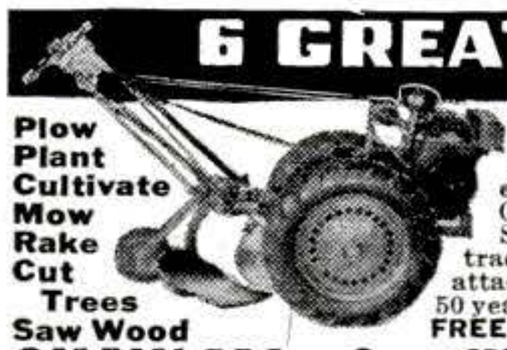

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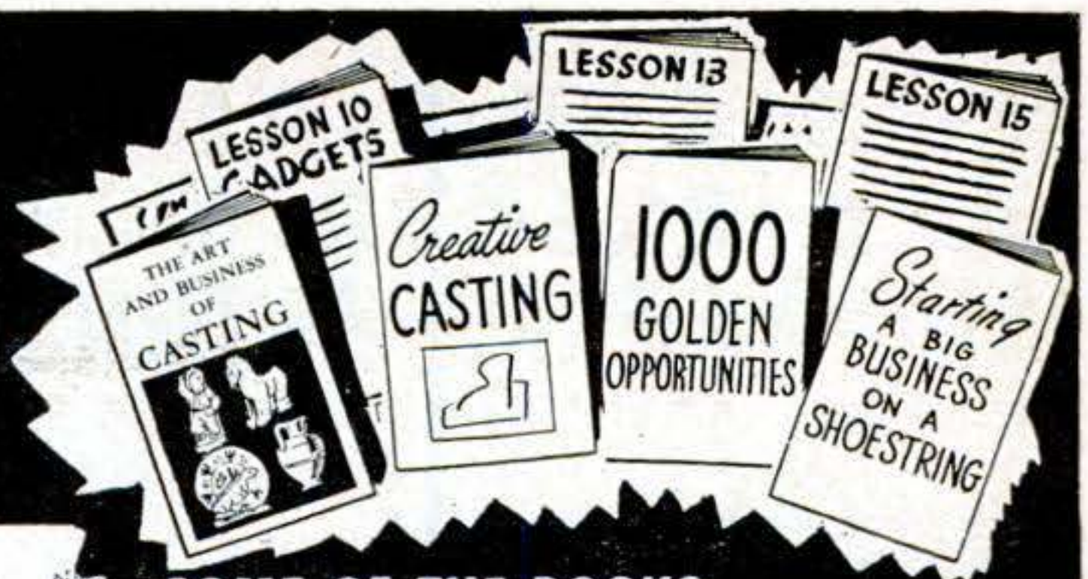

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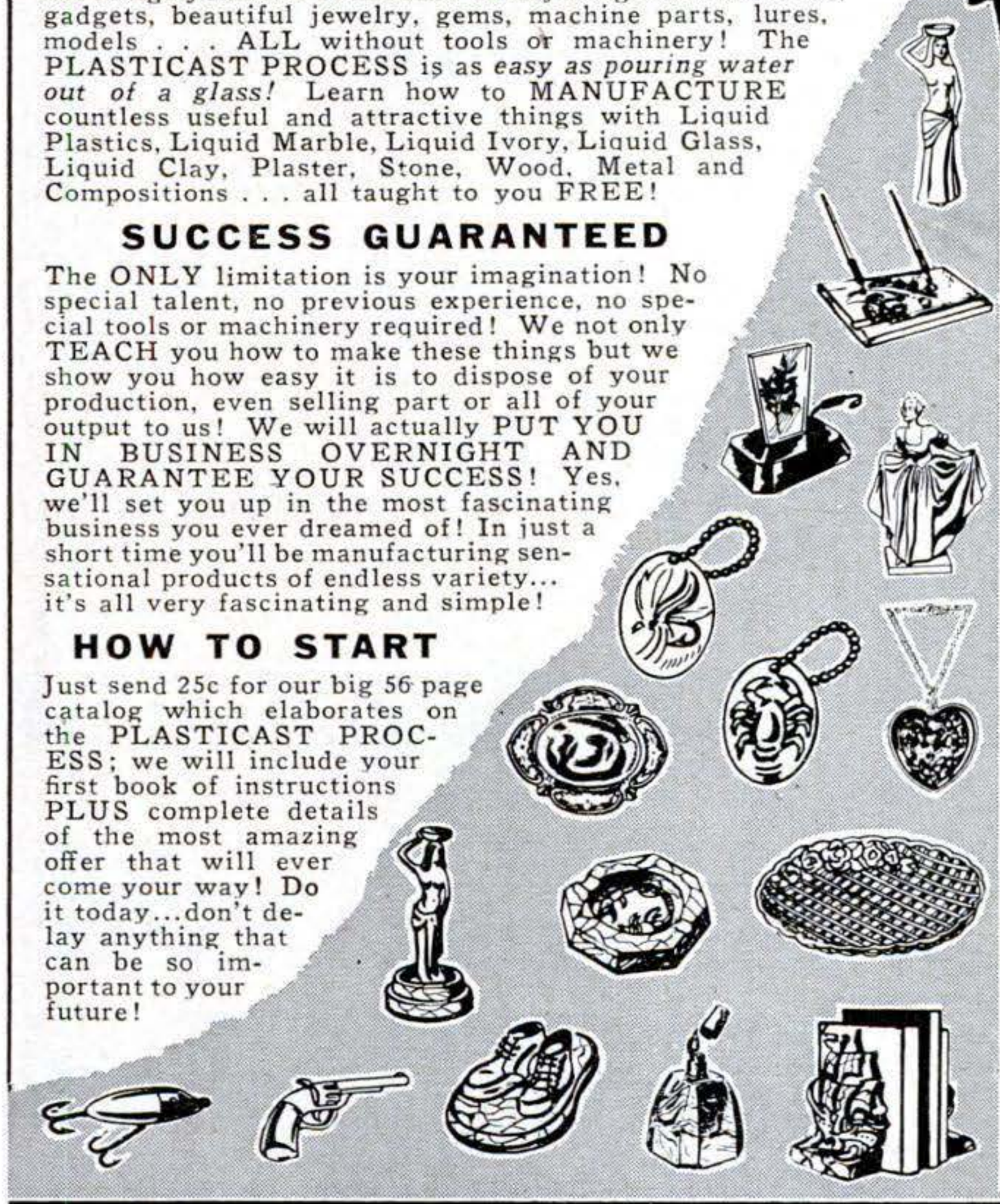

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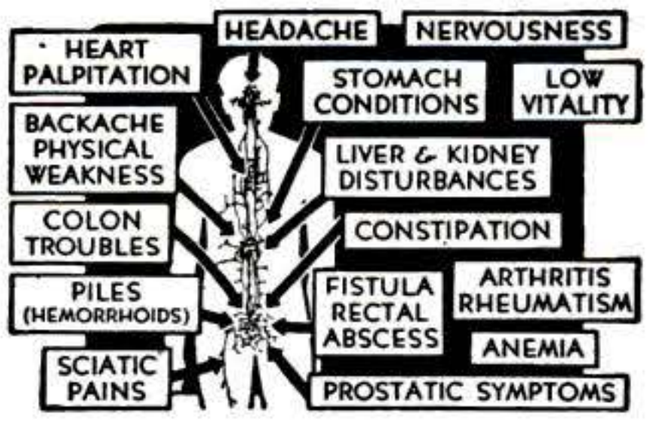

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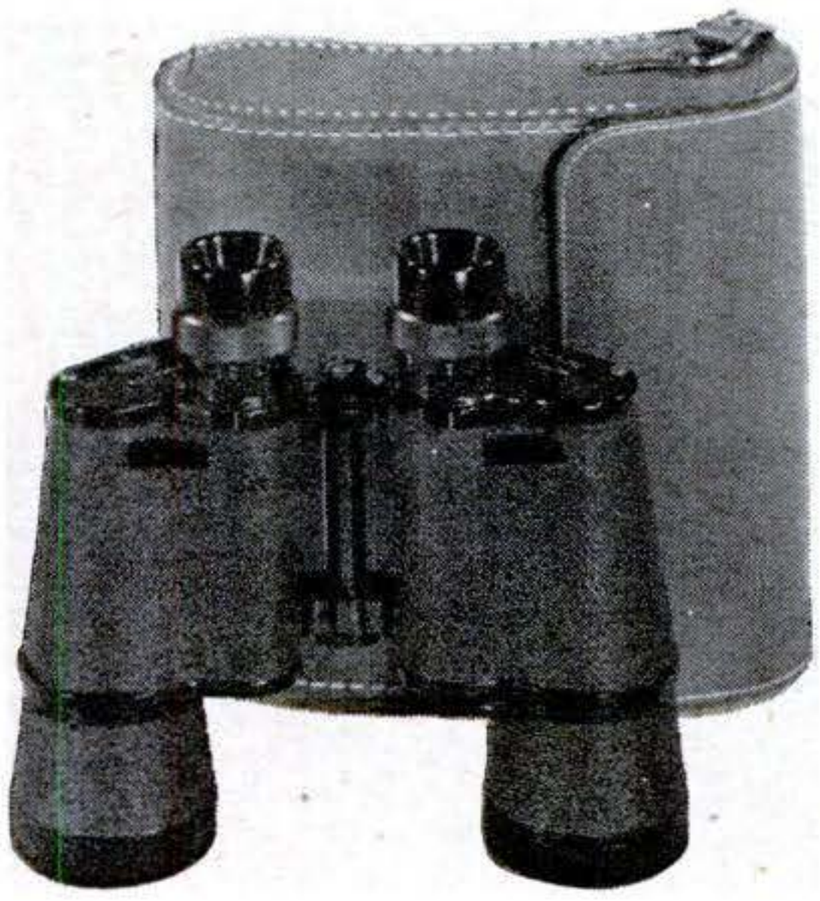

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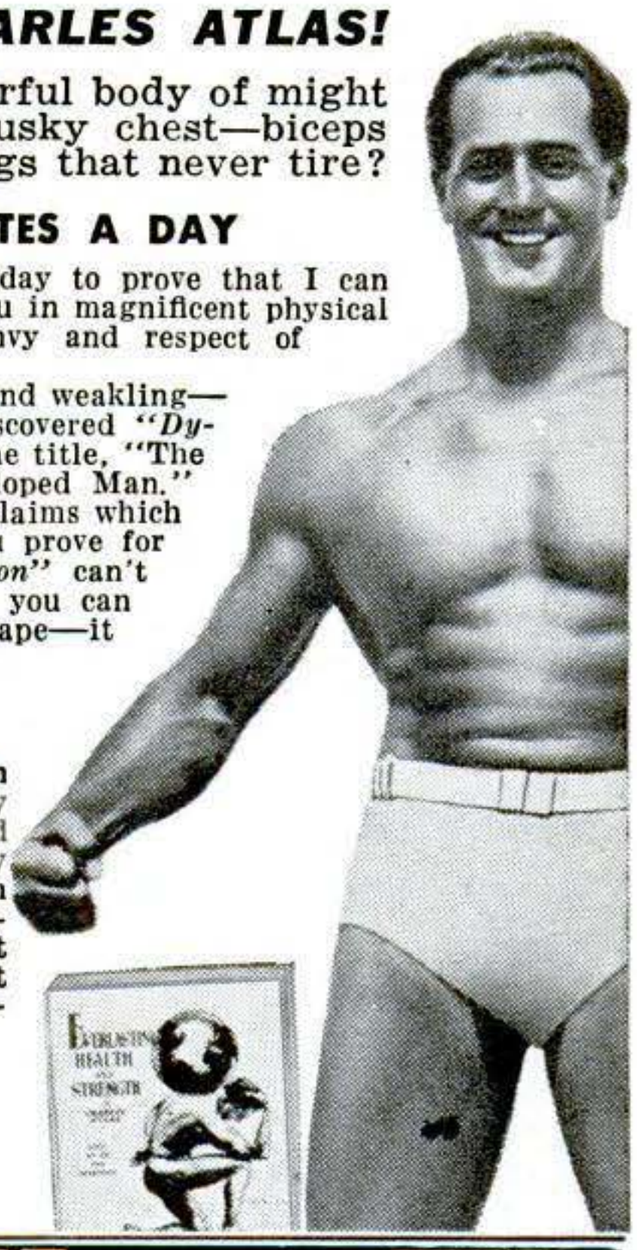

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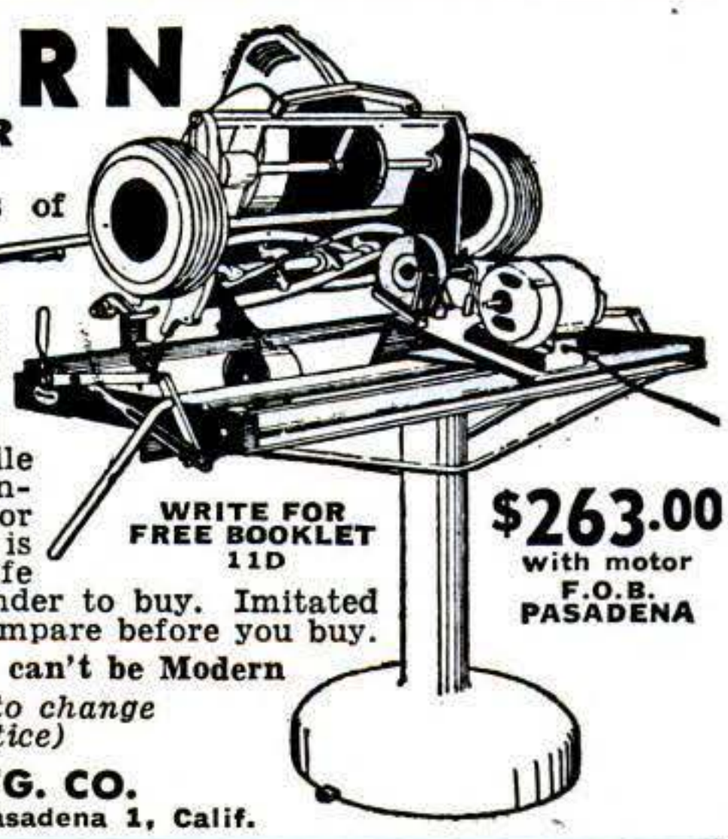

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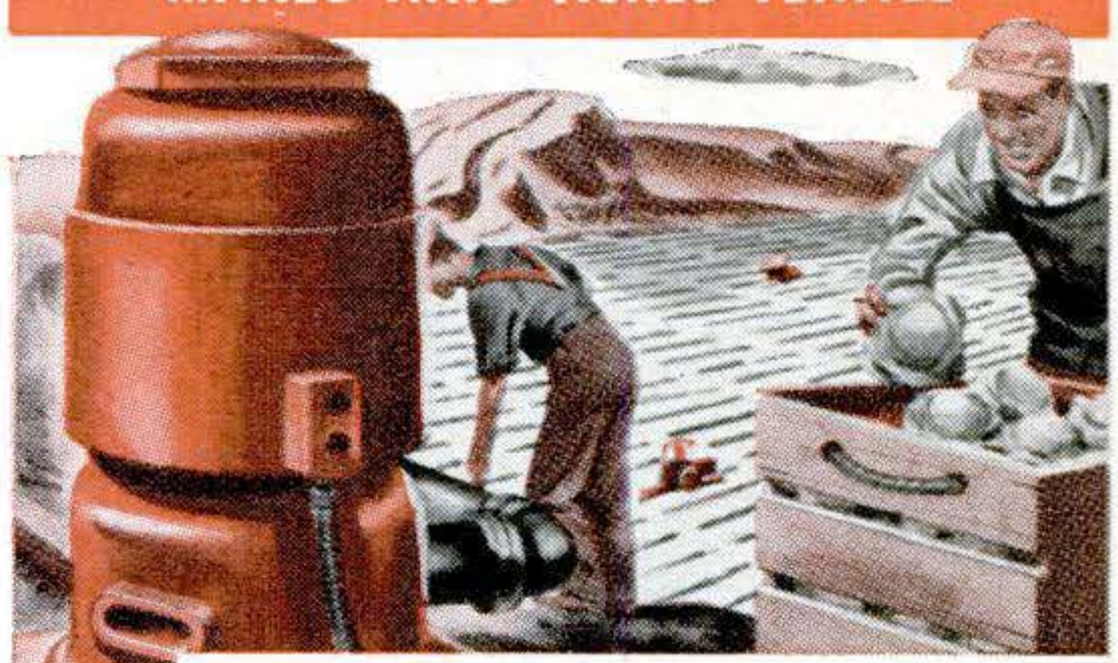

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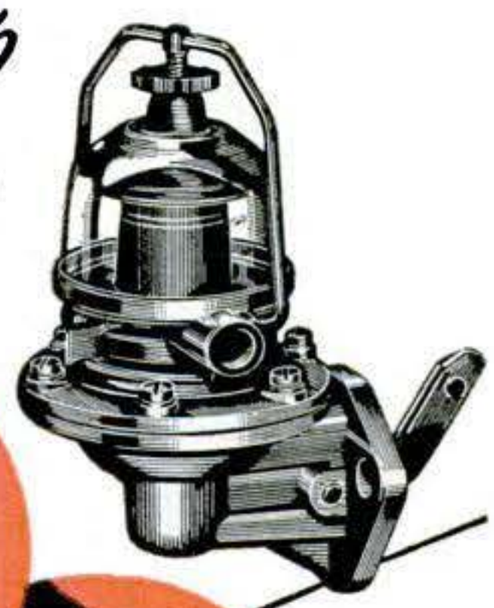

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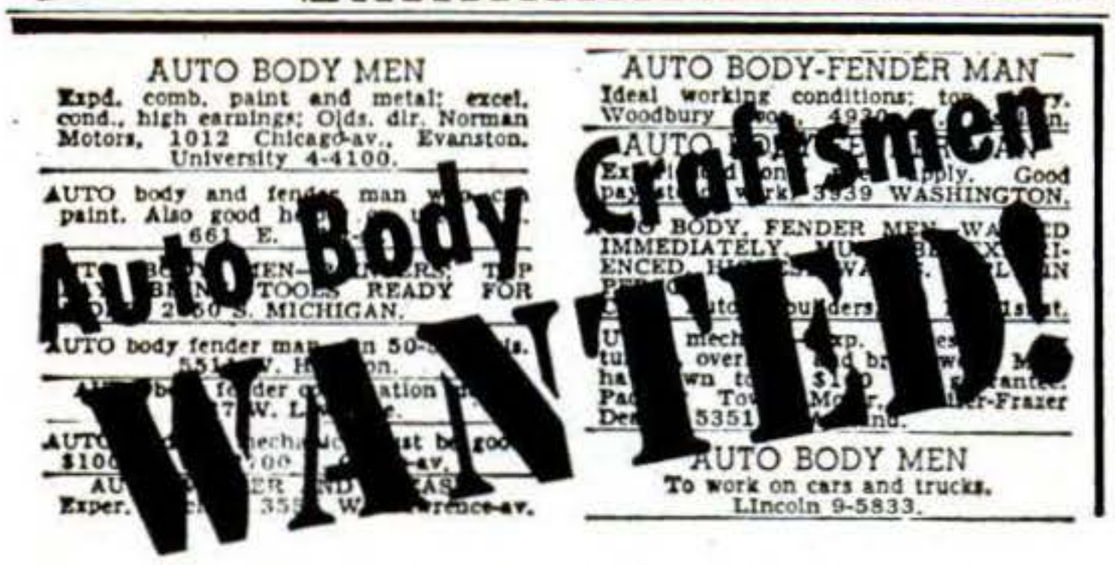

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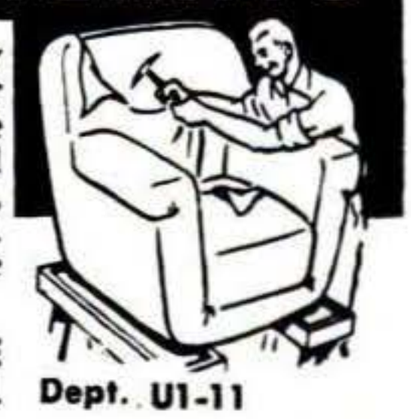

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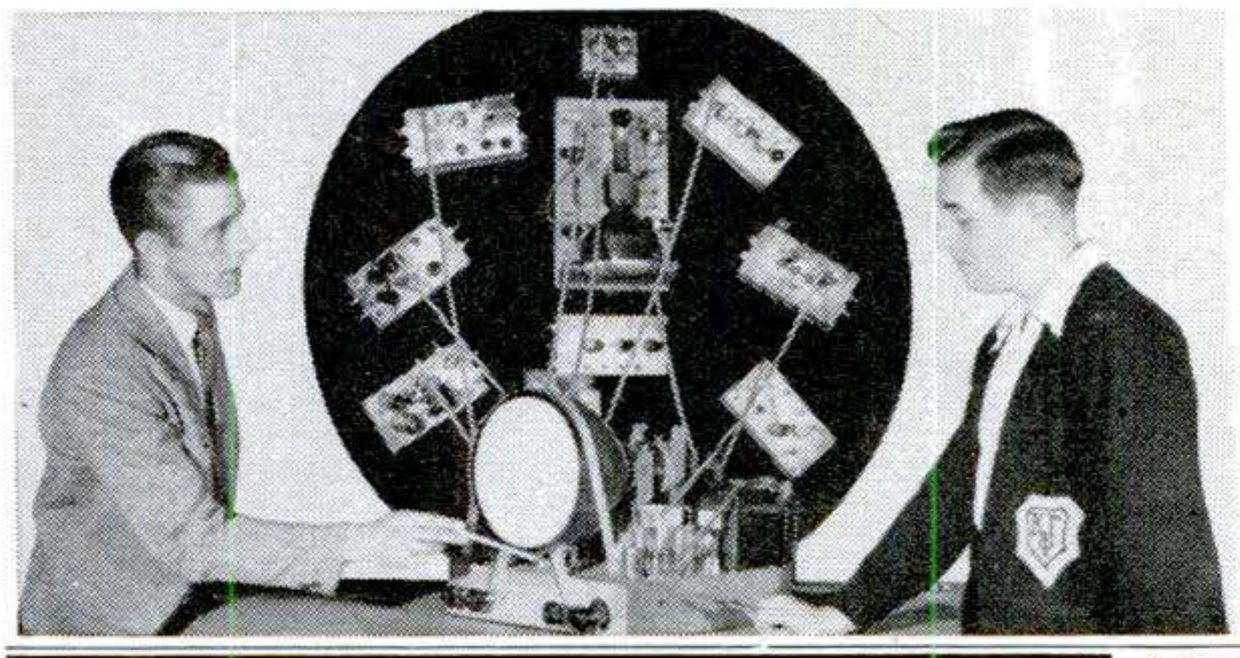

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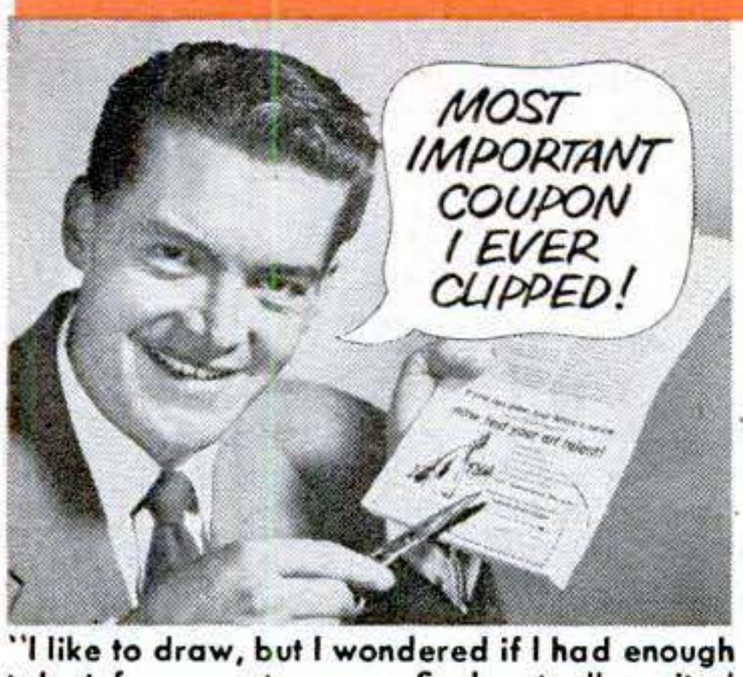

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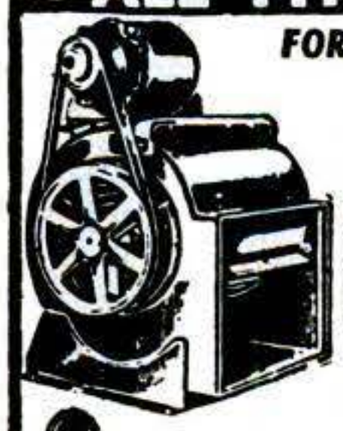

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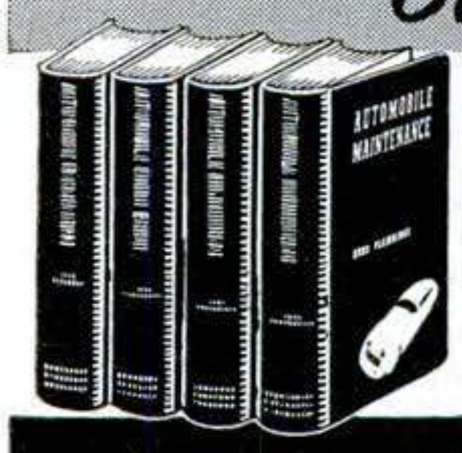

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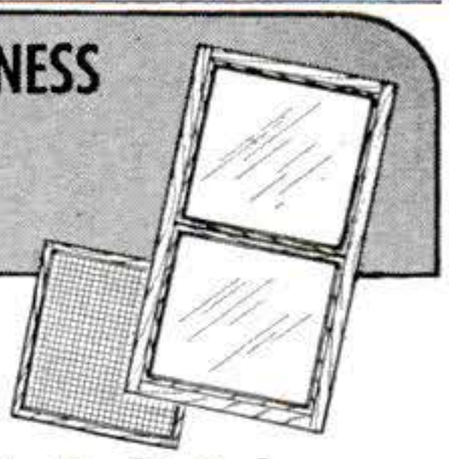

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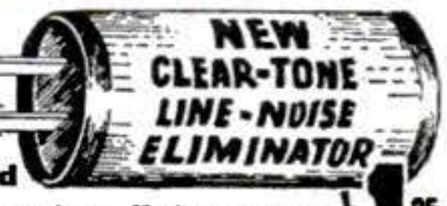

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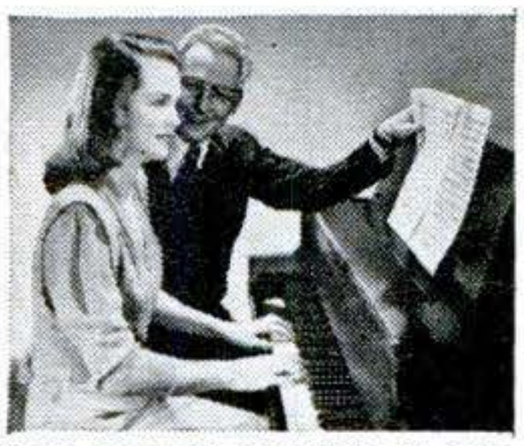

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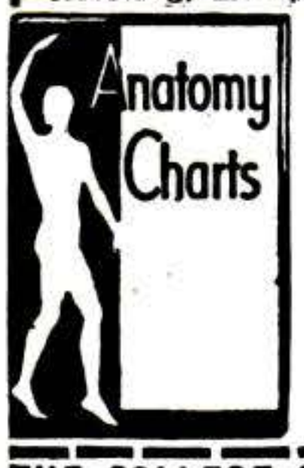

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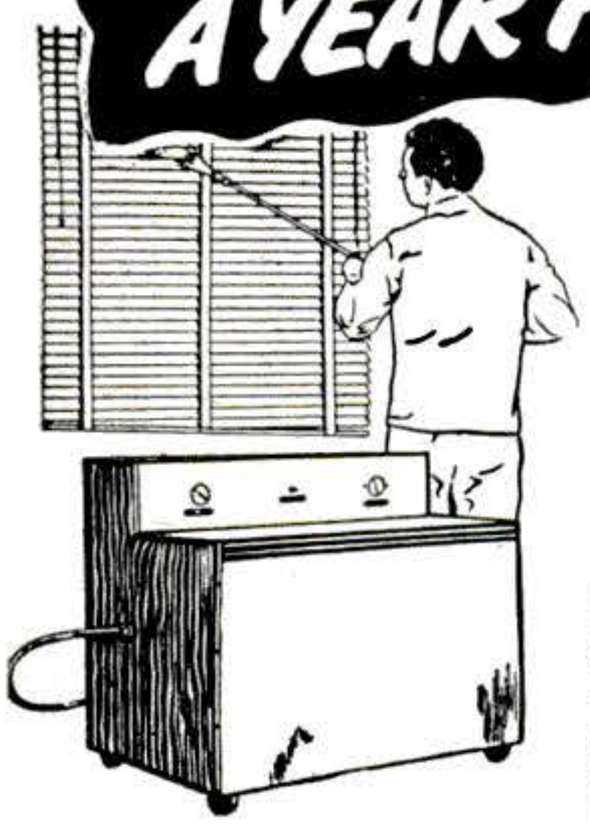

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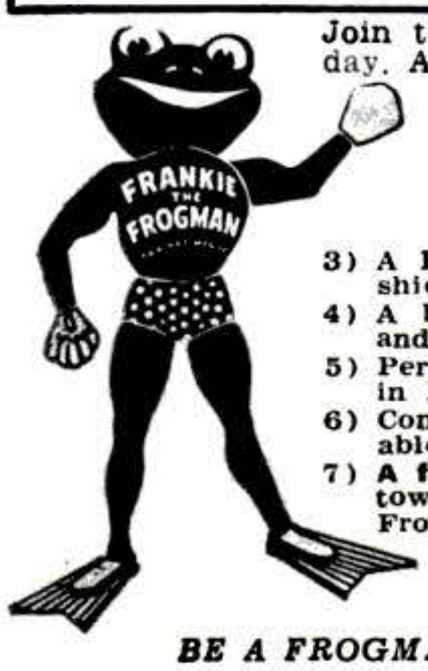

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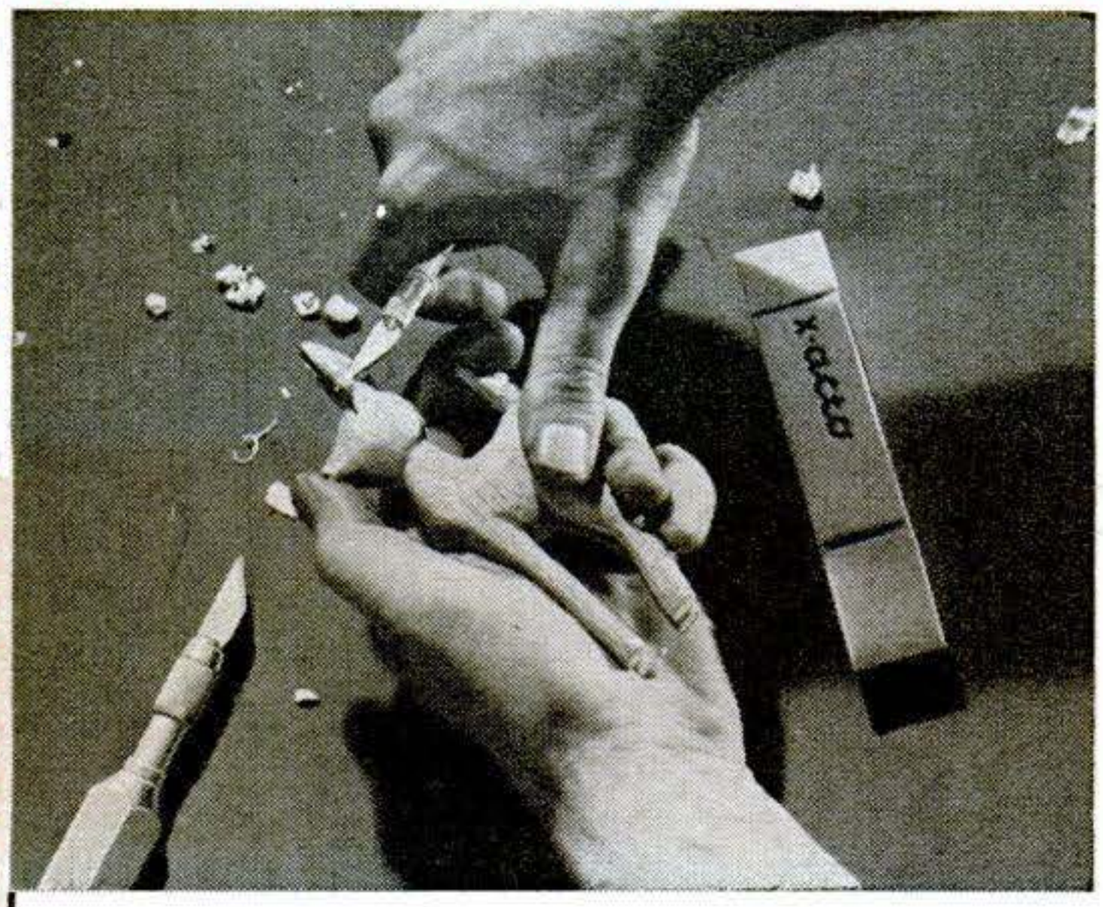

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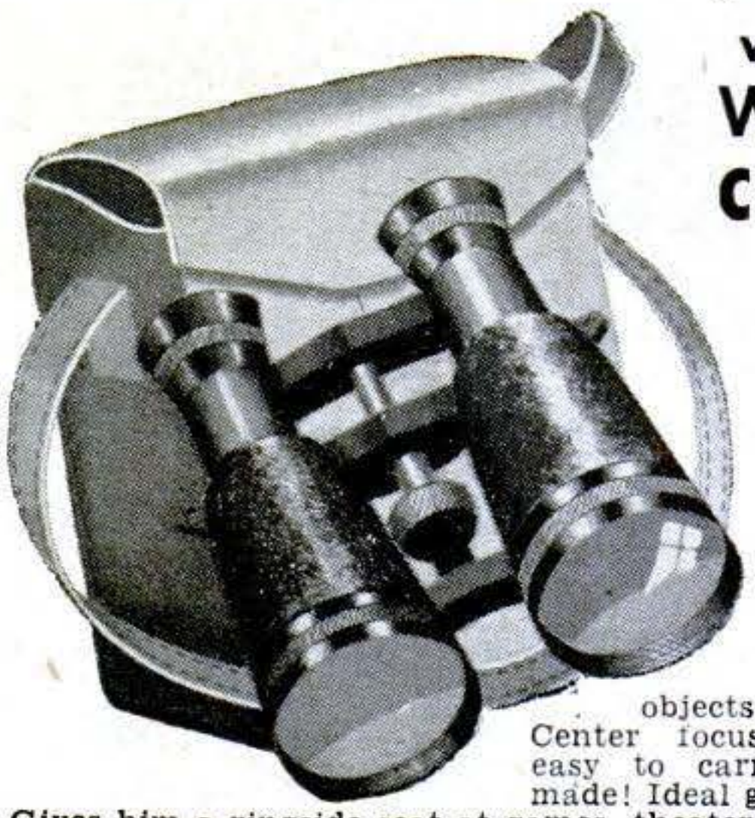

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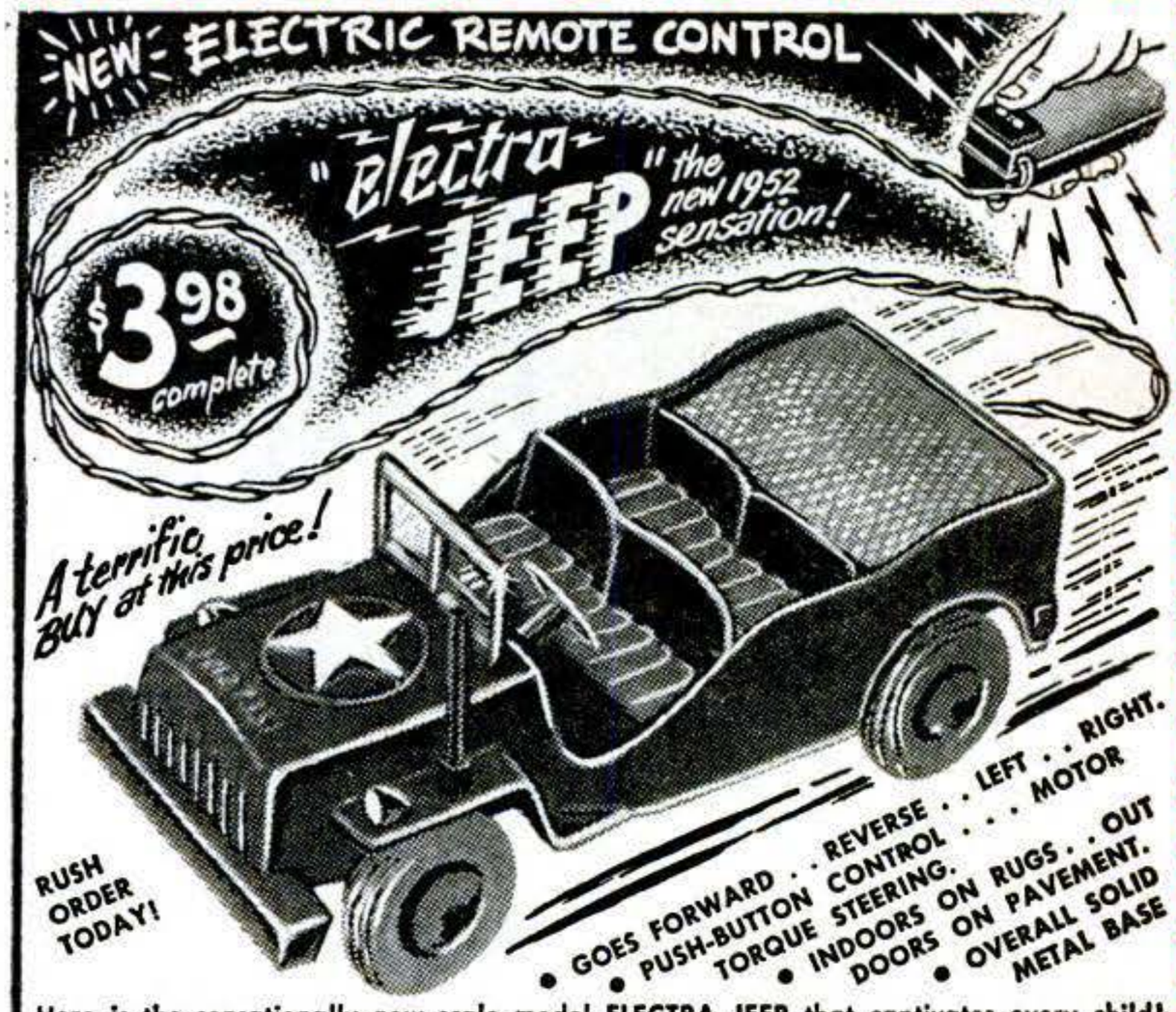

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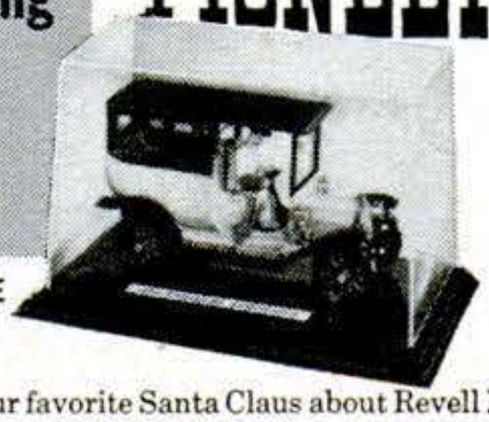
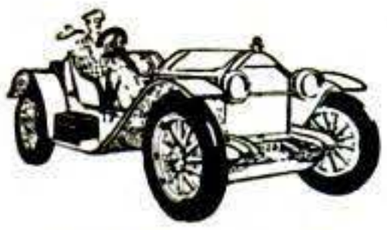


1910 CADILLAC LIMOUSINE
(Display Case not incl.)

1910 MODEL T FORD



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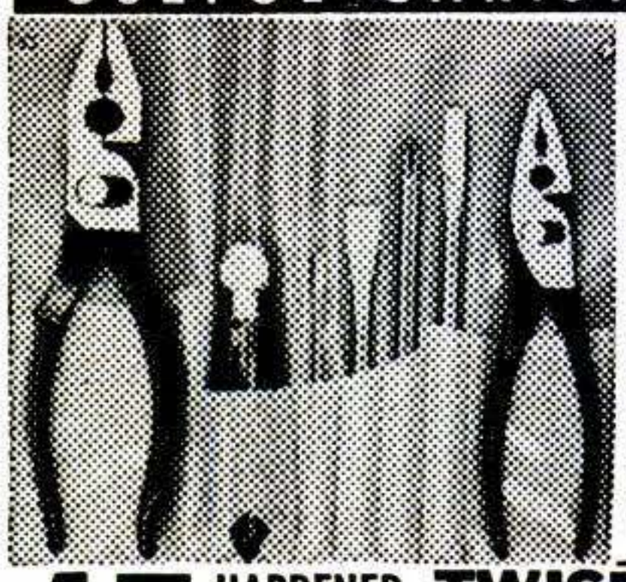

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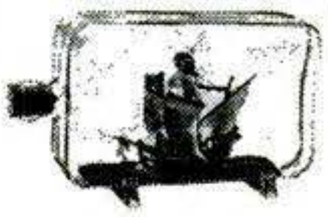

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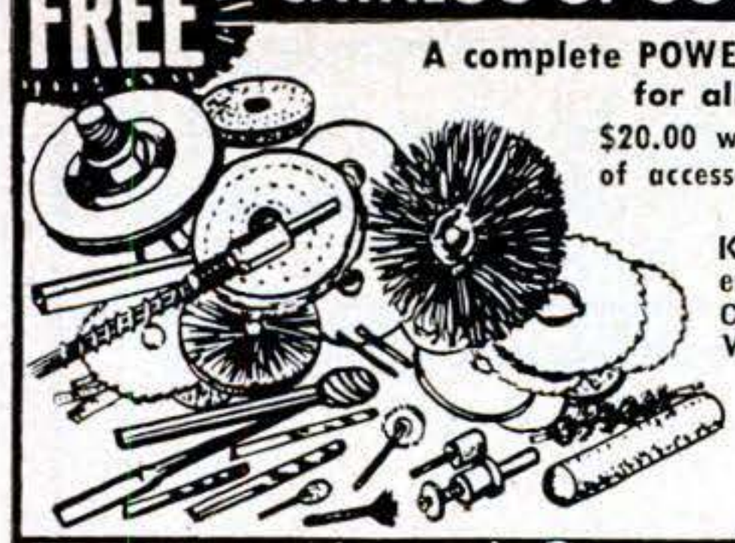

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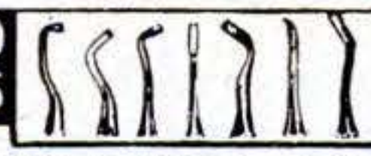

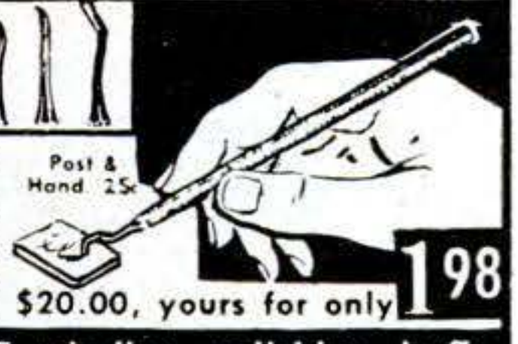

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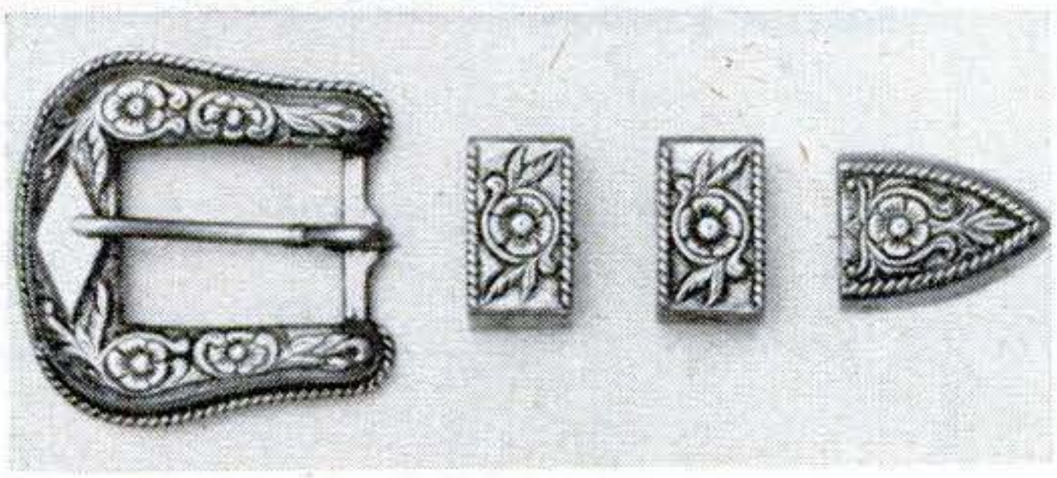

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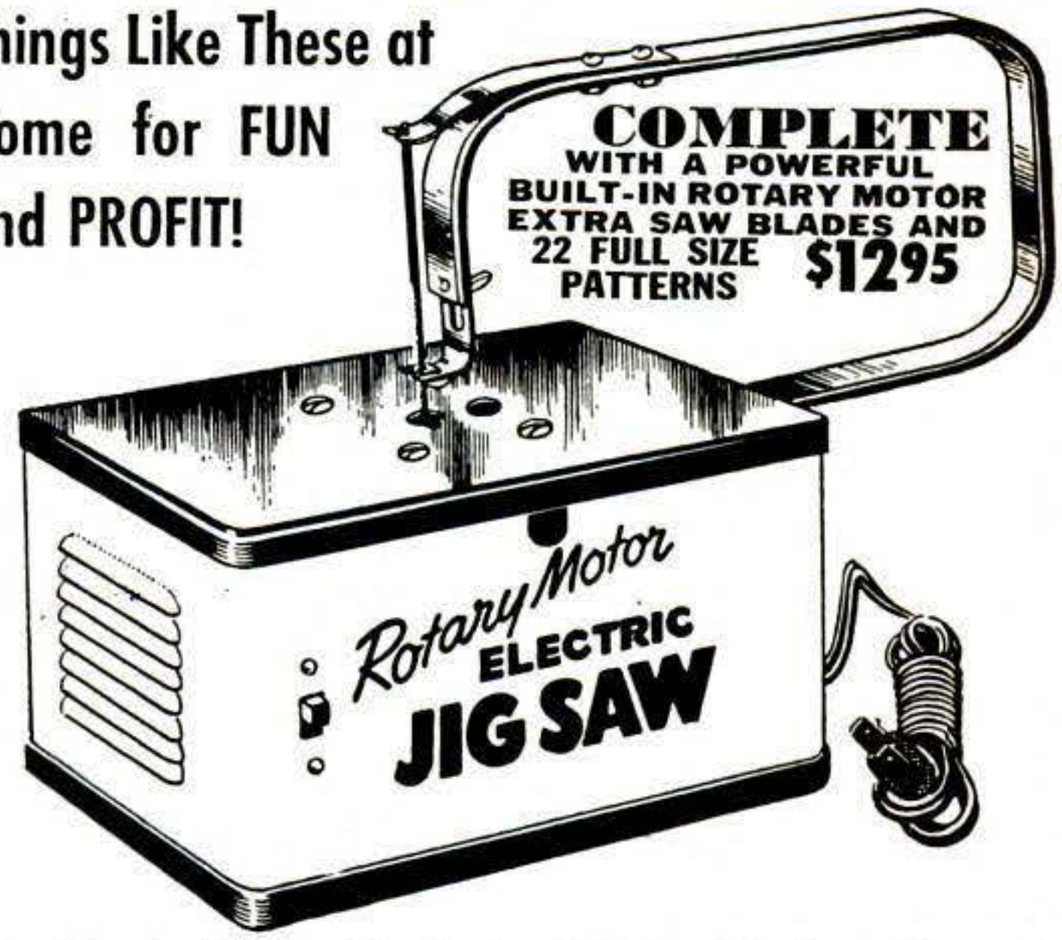
Make Hundreds of Useful, Practical and Artistic Things Like These at Home for FUN and PROFIT!



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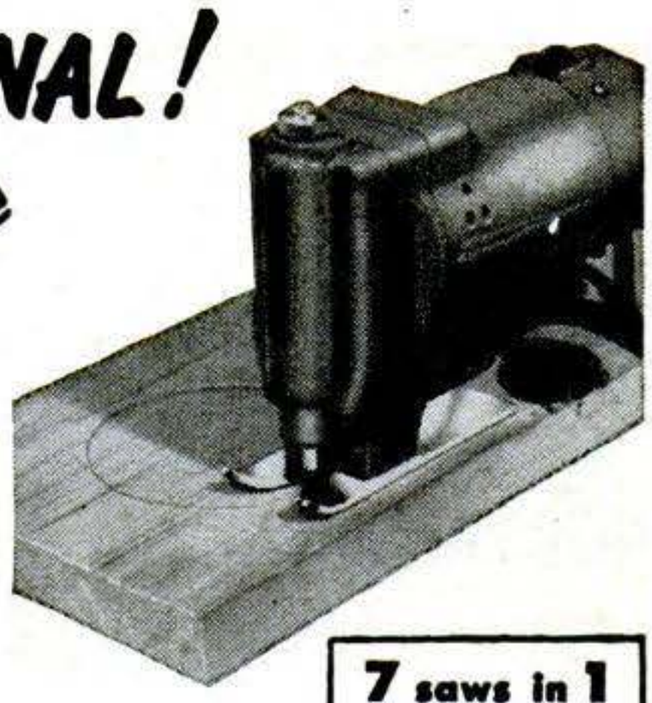

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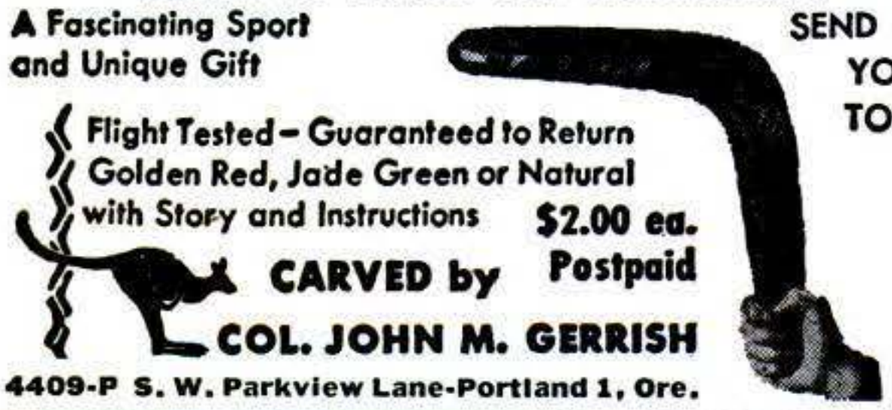

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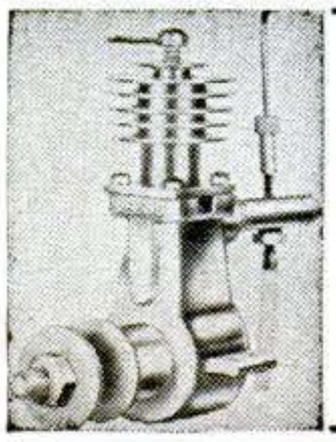

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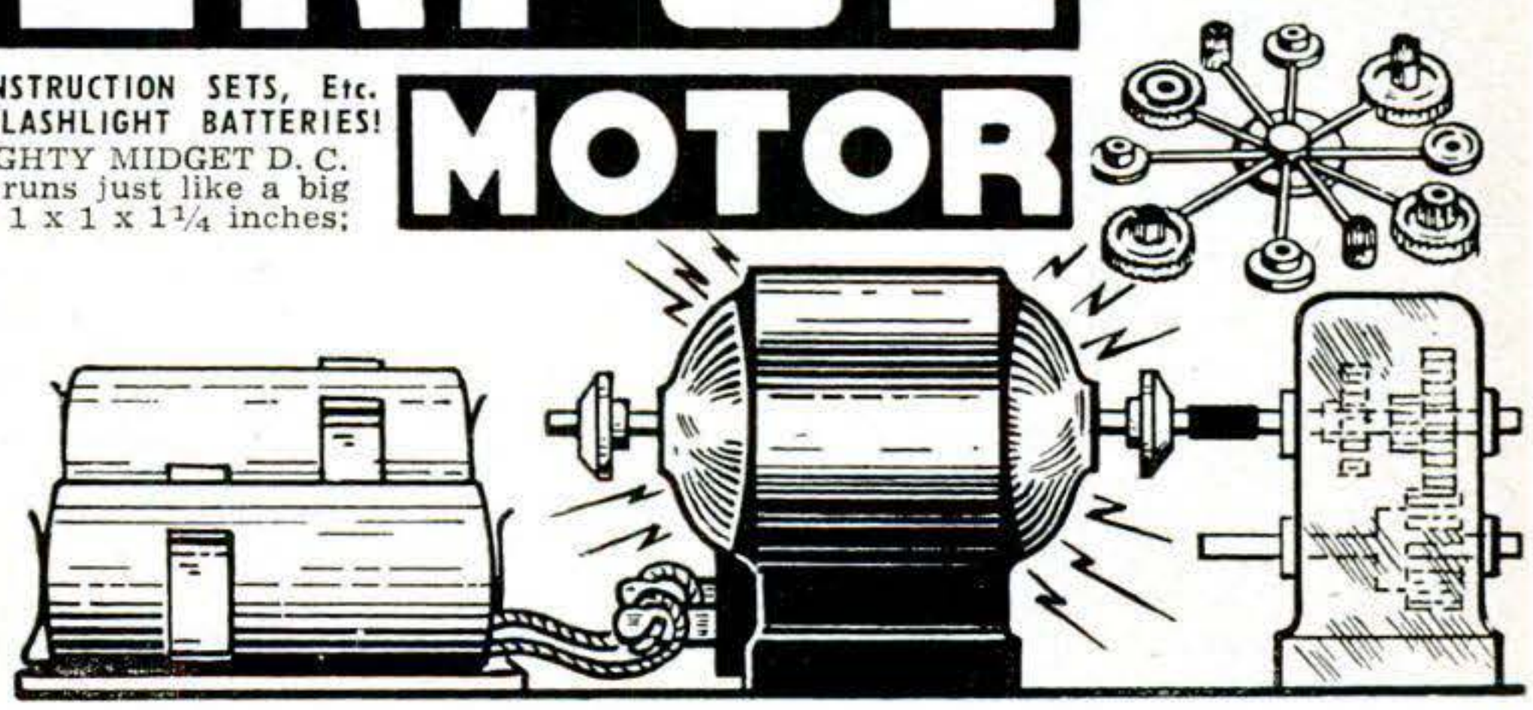

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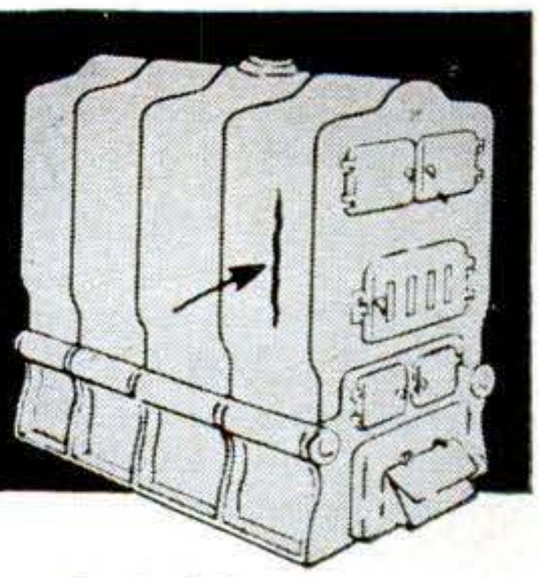

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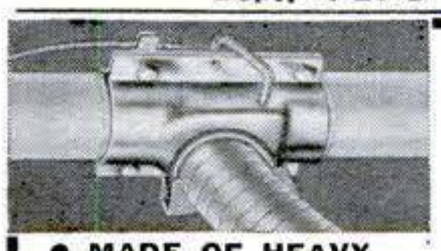

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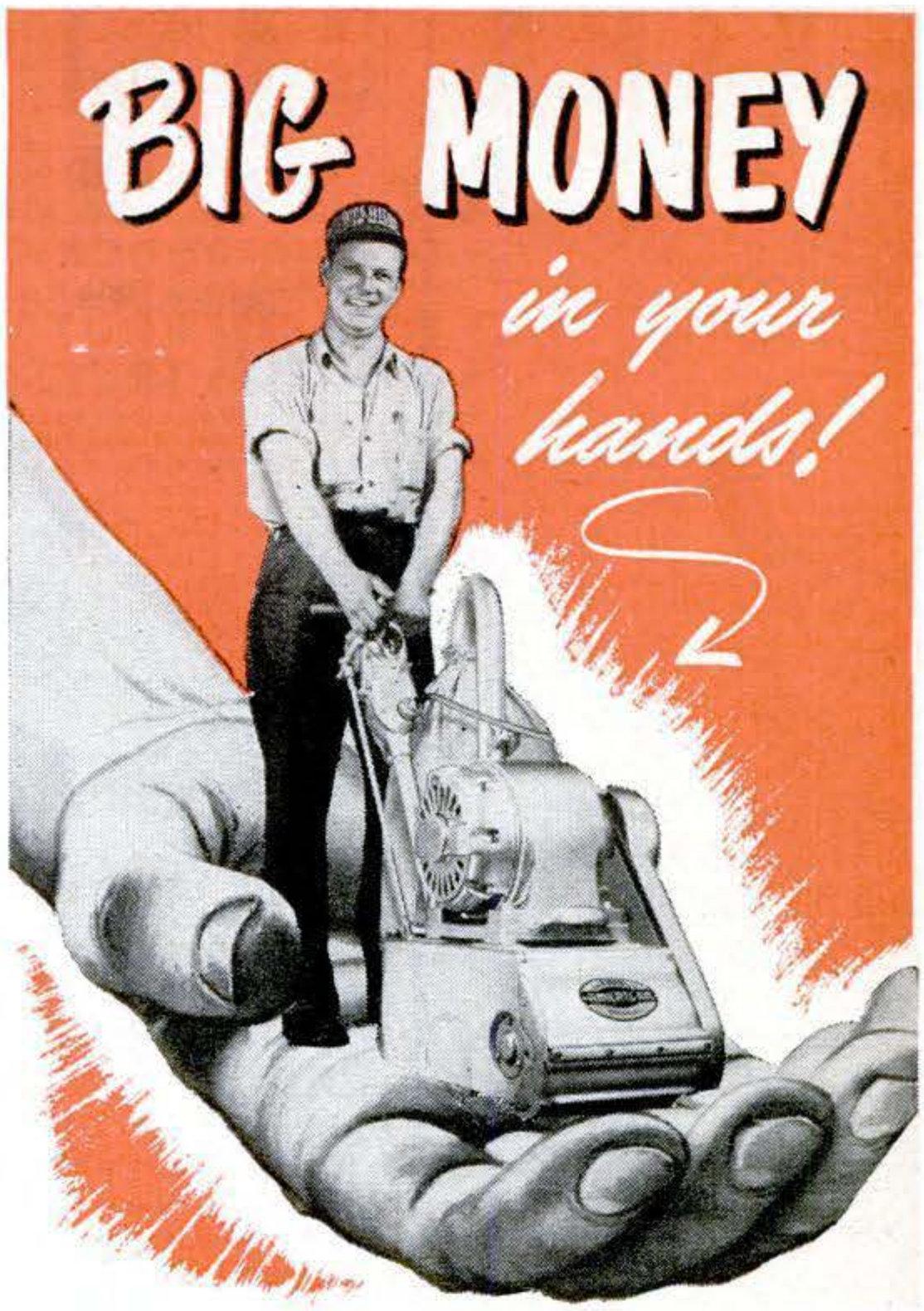

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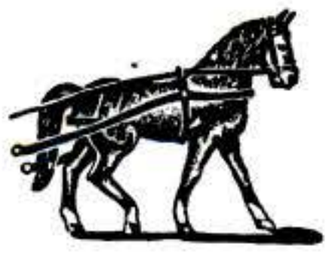

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650x16	5.78	800x15	6.88	700x20	12.88	1000x22	21.98
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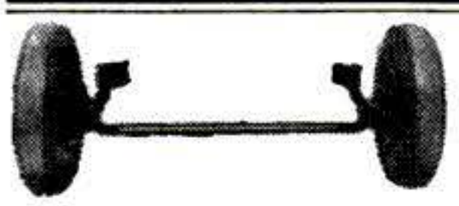

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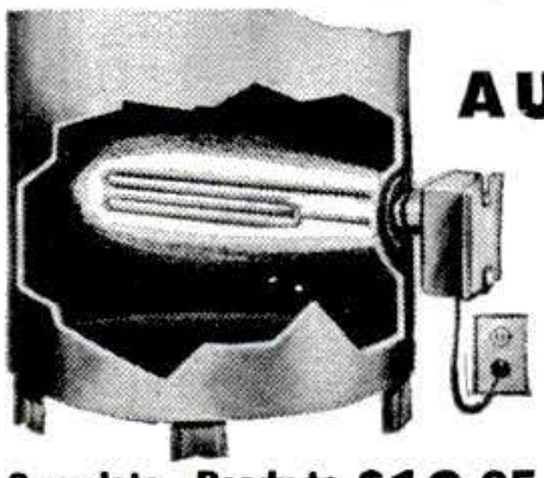

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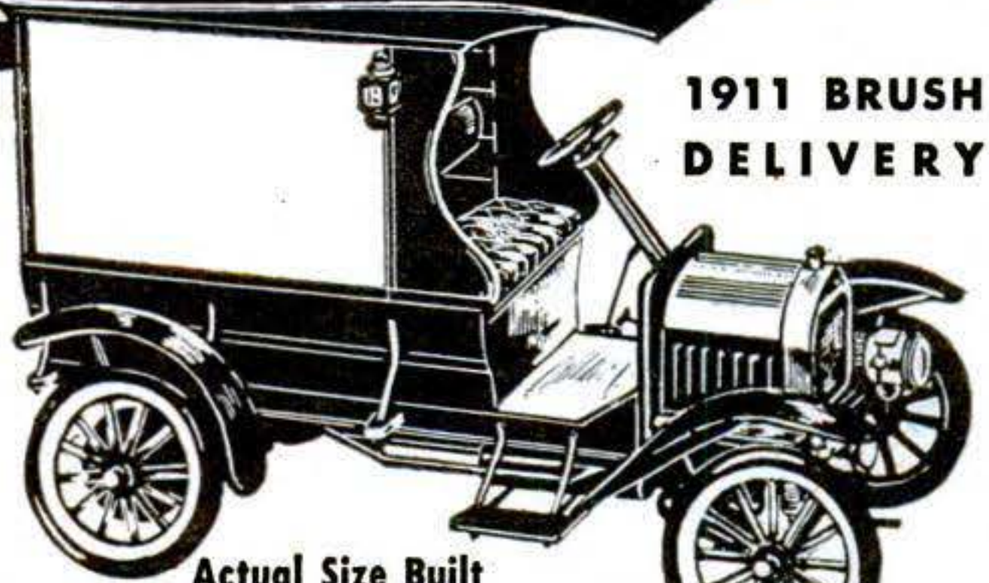

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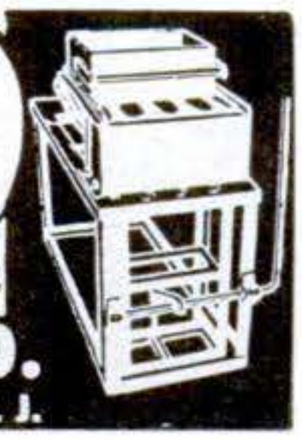

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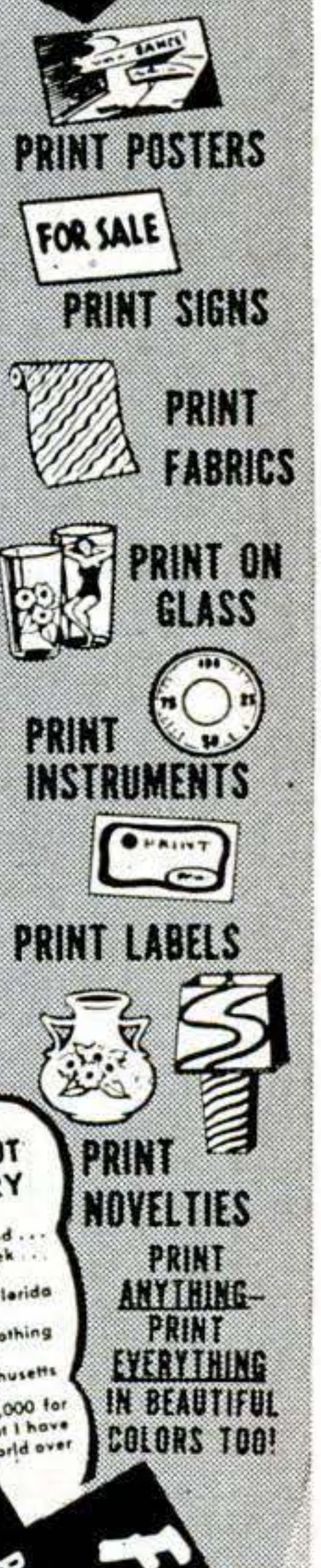

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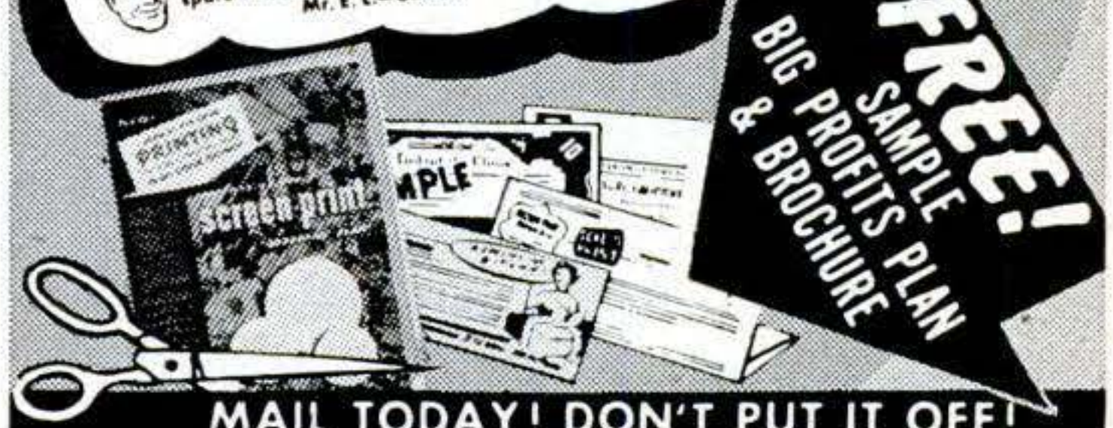

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700-16	6.52	710-15	5.72	750-15	13.22	825-20	18.22
700-16(6)	8.72	760-15	5.92	750-17	11.52	900-20	17.22
750-16	7.02	800-15	6.62	700-18	15.82	1000-20	17.80
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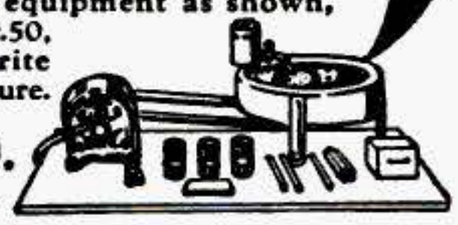

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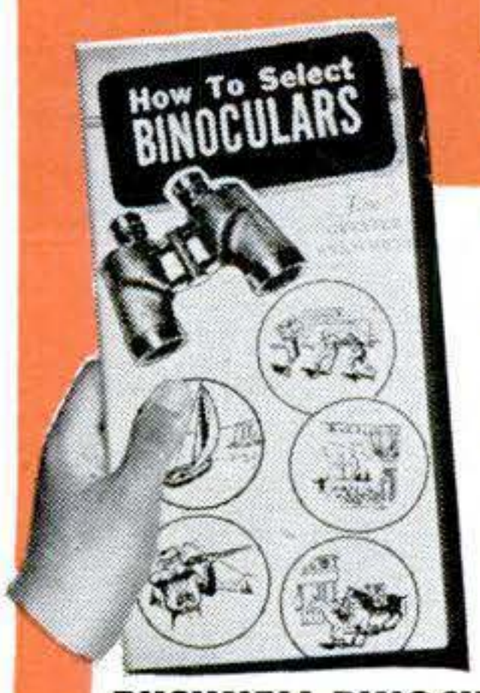

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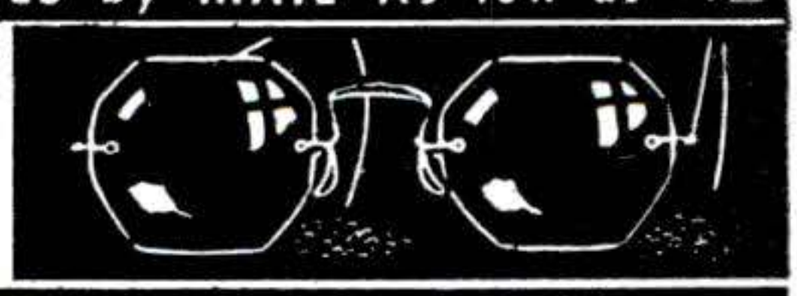

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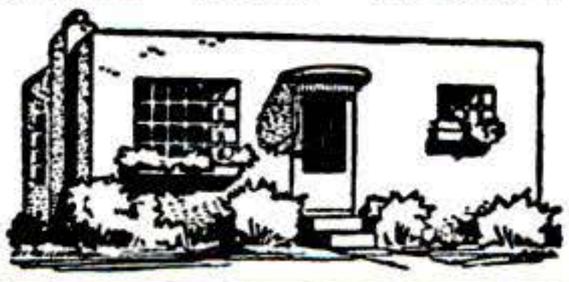

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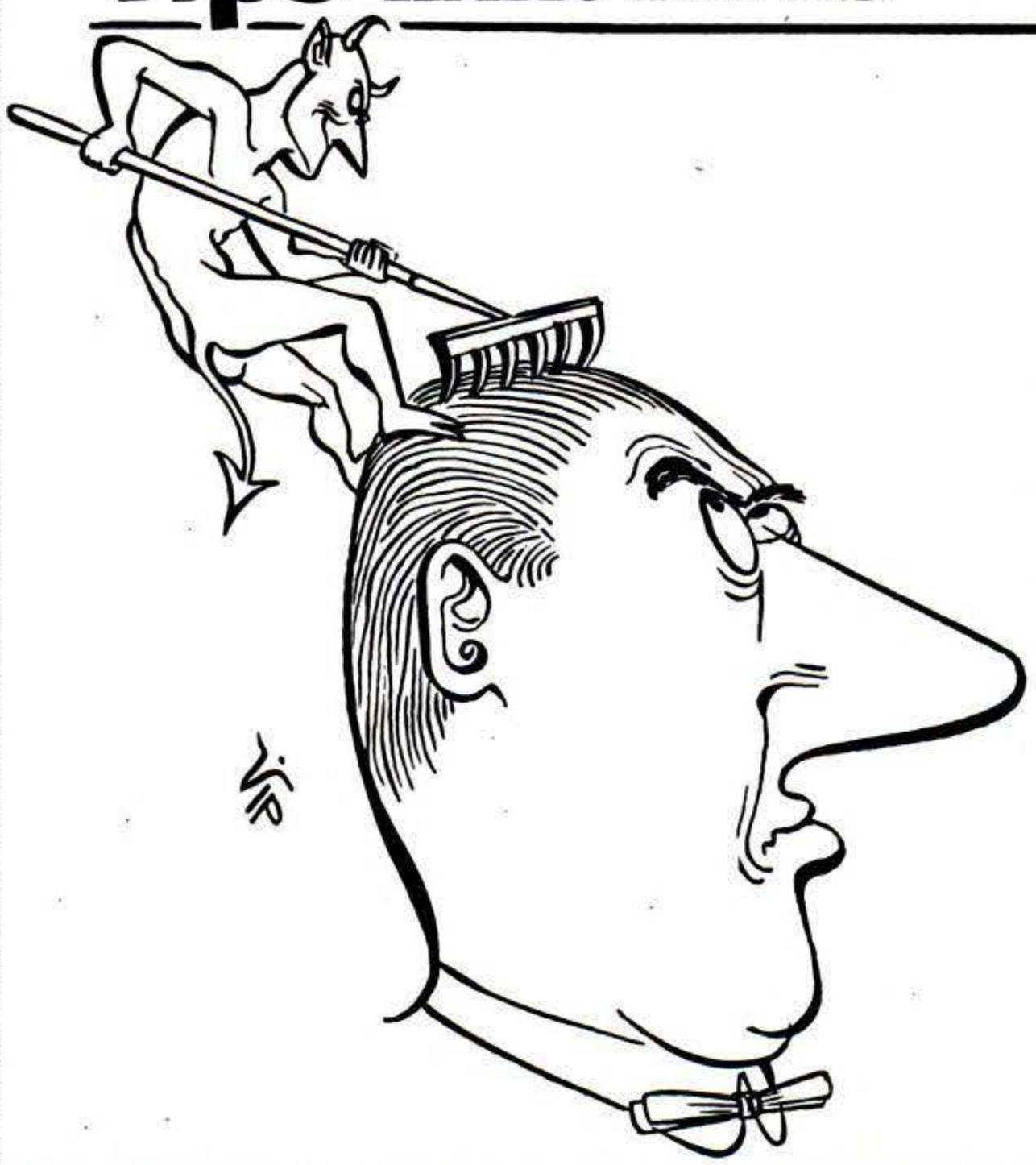

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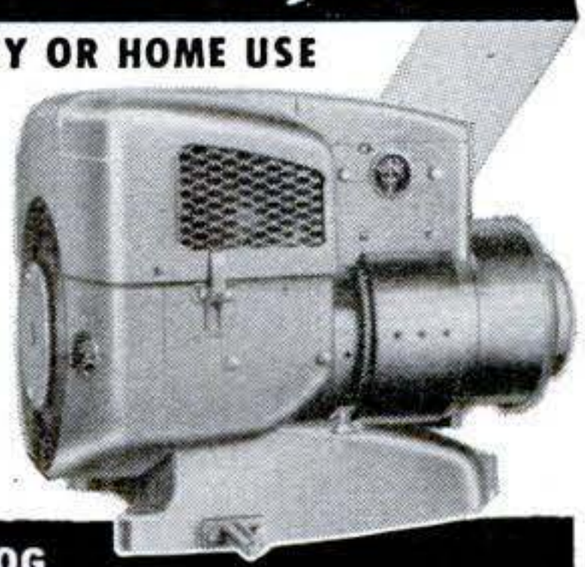

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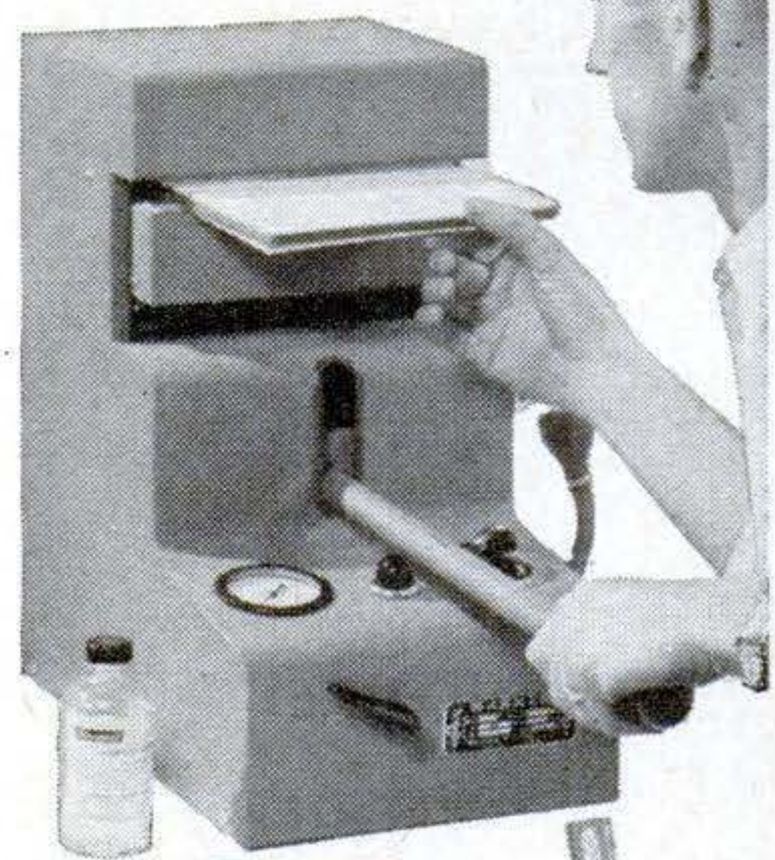

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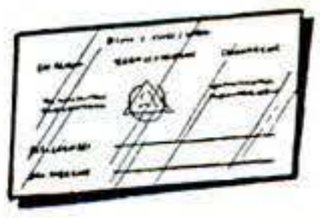

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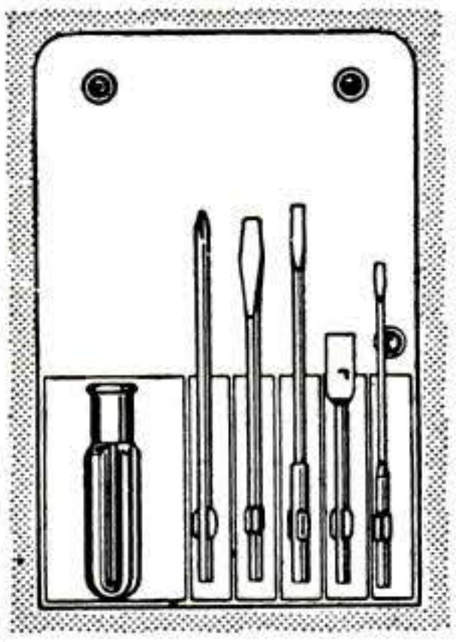

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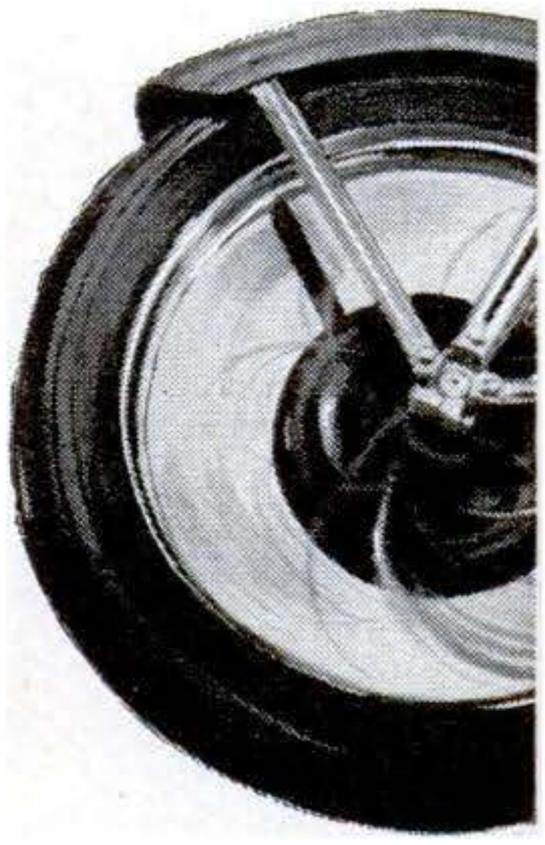

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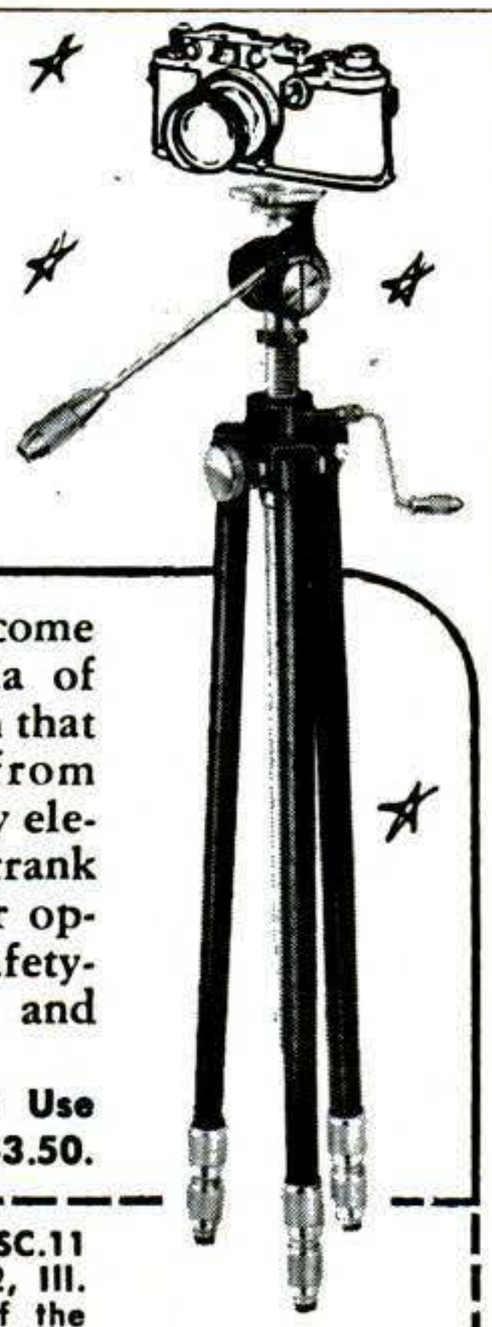

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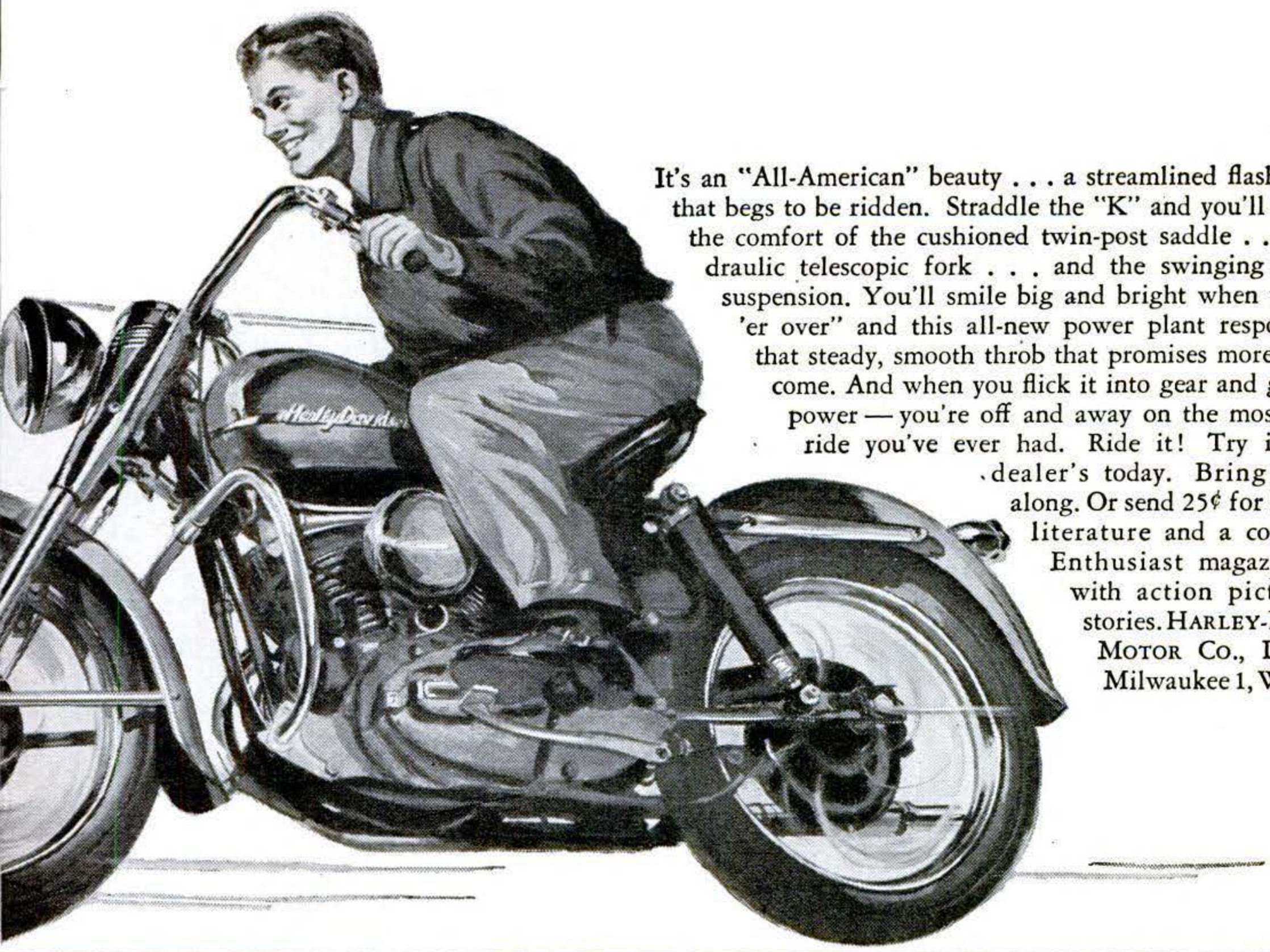

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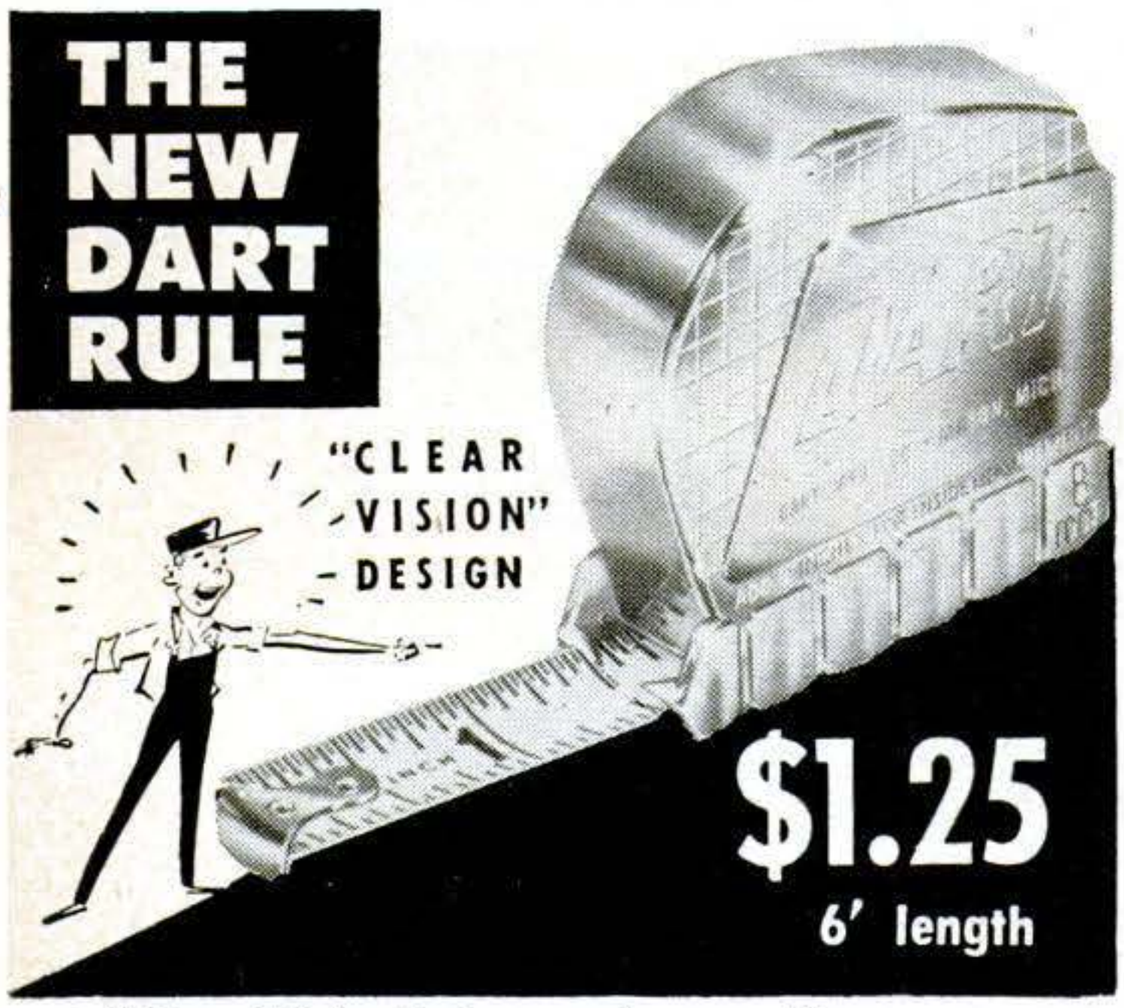

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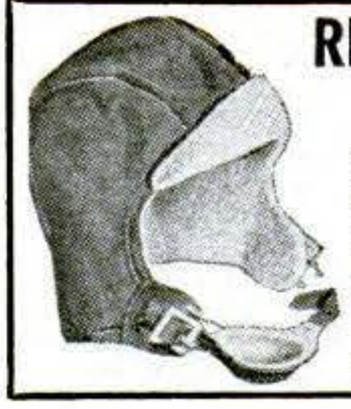

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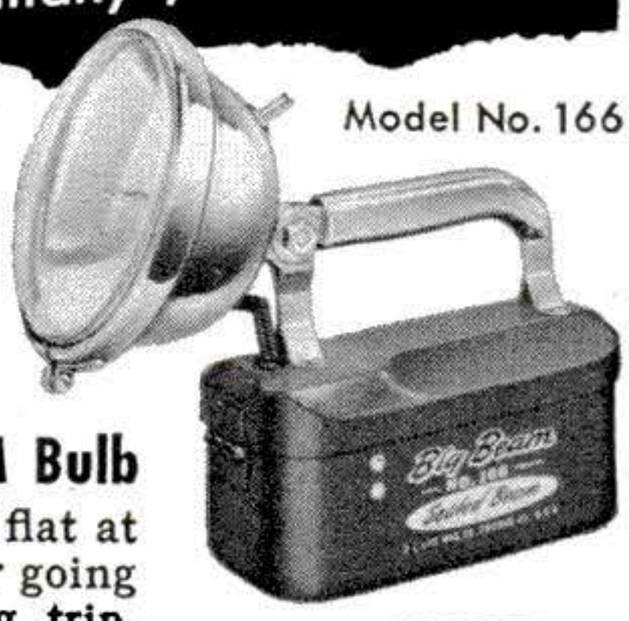

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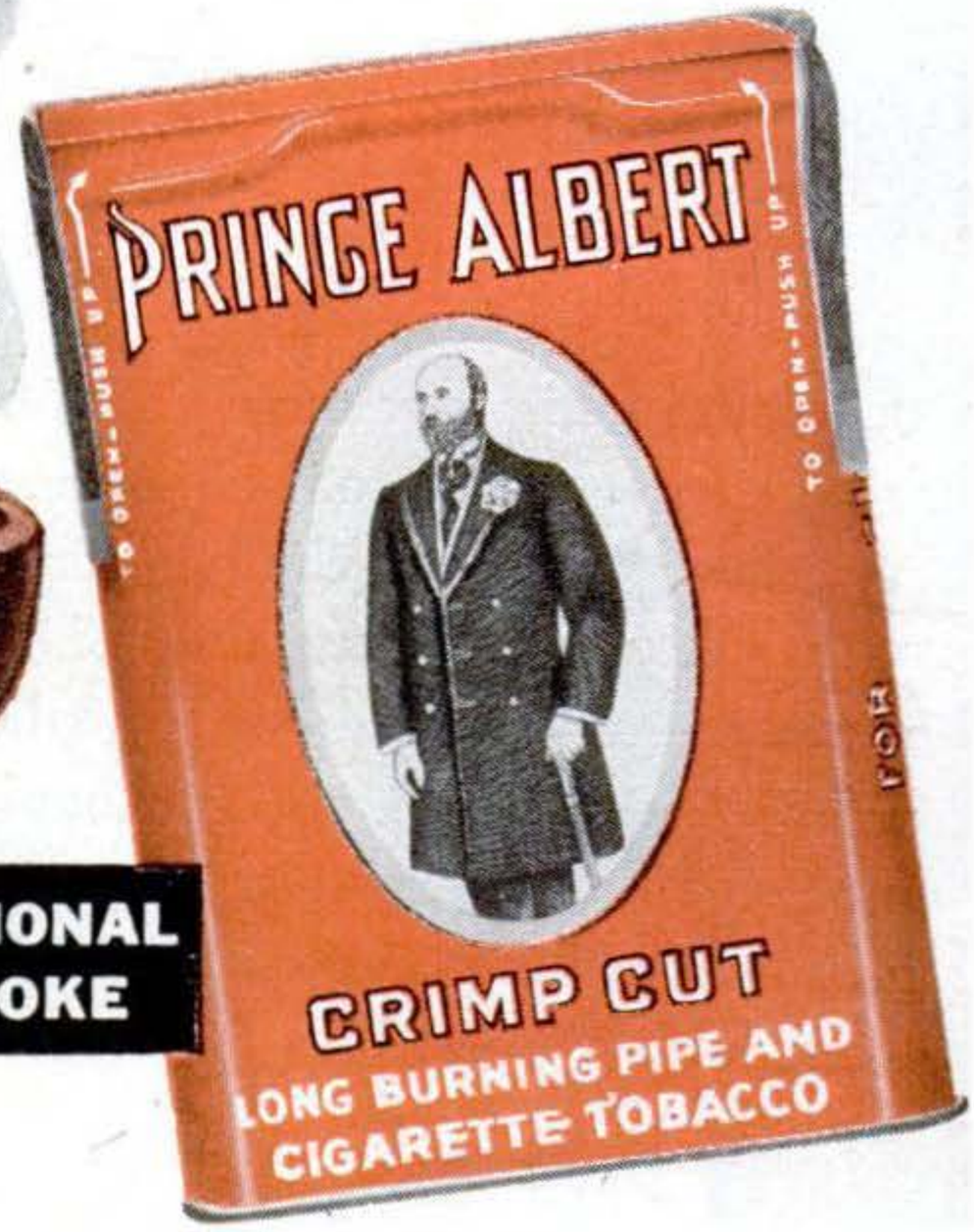

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This Gun Shoots Atomic Shells

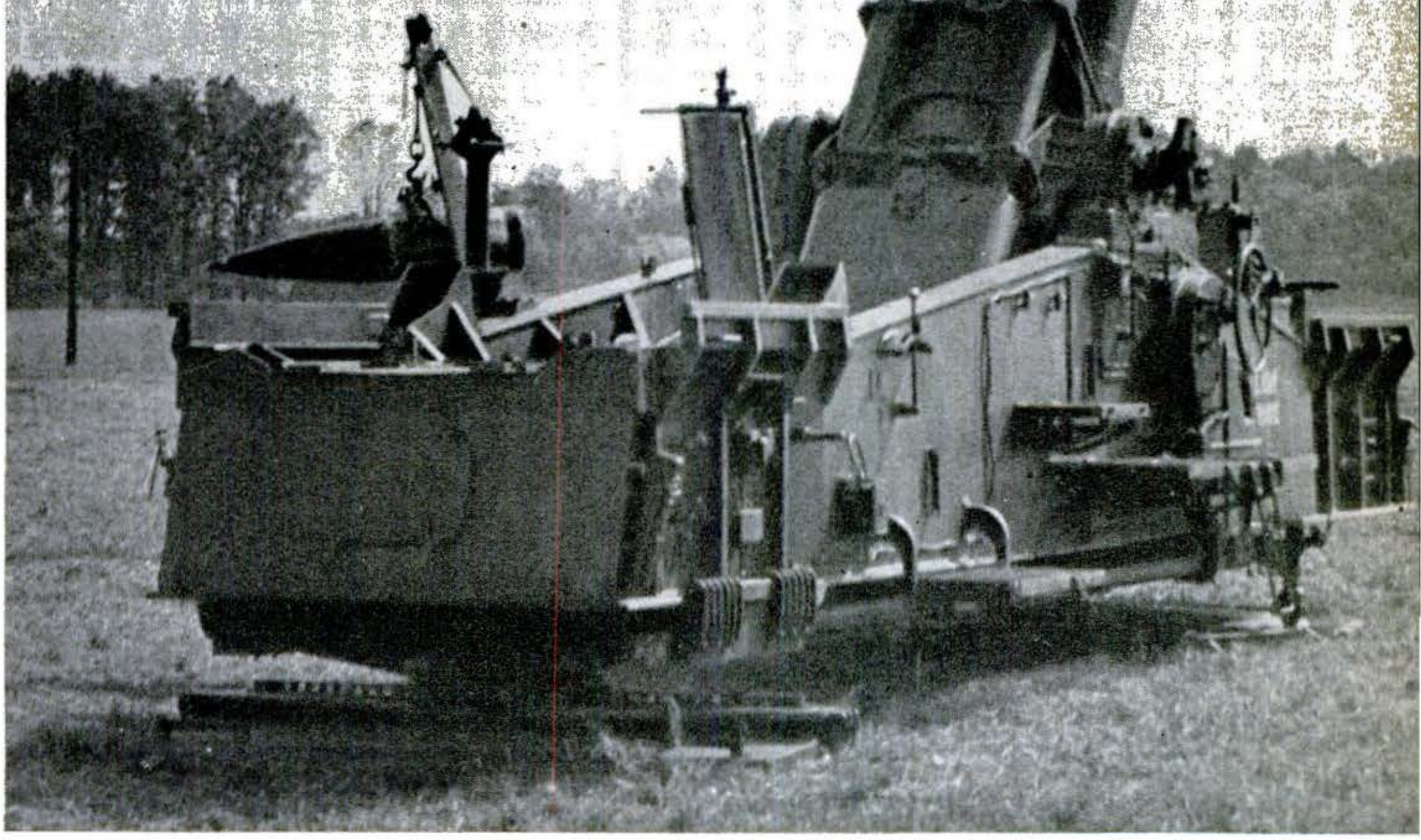
Cradled between two huge tractors, Army's most destructive weapon rocks into position fast.

PSM PHOTOS BY W. W. MORRIS

THE wraps are off the U. S. Army's atomic cannon, the biggest and deadliest of ground weapons. It can accurately blast a target at 20 miles in any weather, day or night, when atom-loaded airplanes could not.

Called the 280-mm. T131 (nickname: Termite), it weighs 85 tons and measures 84 feet long complete. Yet it can go almost anywhere, travel 35 miles an hour on the road and get ready to fire much faster than other big guns. Two giant six-wheel tractors cradle the gun between them, zigzagging the rocking, pitching carriage across rough ground like some fantastic reptile.

Pictures on the next two pages show how the gun will fire an atomic shell.—*Martin Mann.*



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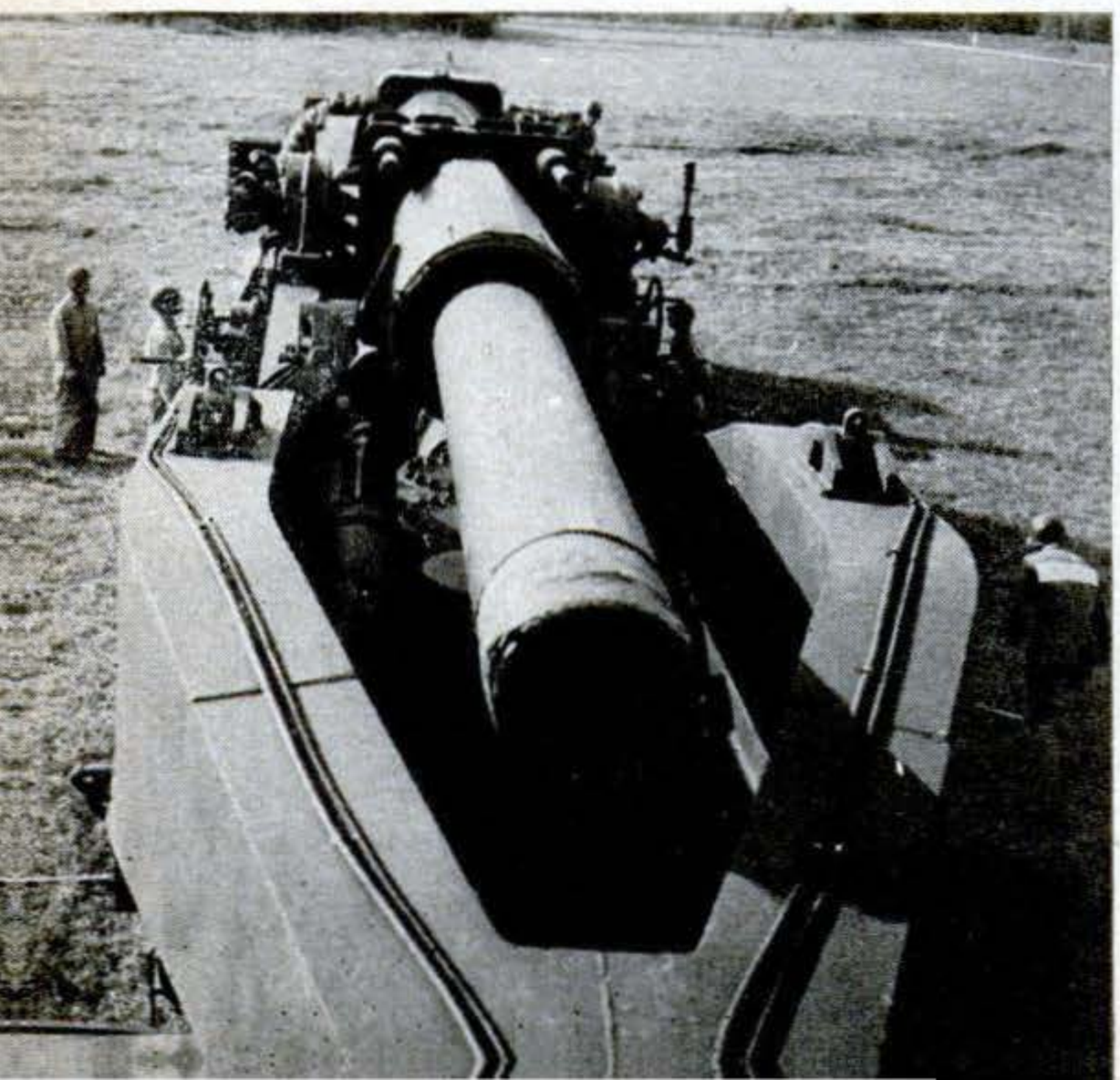
1 HEAD AND TAIL TRACTORS haul atom gun as completely assembled unit, nearly ready to fire. They can run in line, turn to carry gun sideways and turn corner in 28-foot street.

2 INTERCOM CONNECTS DRIVERS, who steer independently. Front driver can control both throttles and brakes, however. Smooth-riding tractors have automatic transmissions.

3 WINCH EXTENDS AND RAISES GUN after hydraulic pistons lower carriage to ground. Then tractor pulls off. Muzzle is shown below between fork on tractor that fits ways on gun.



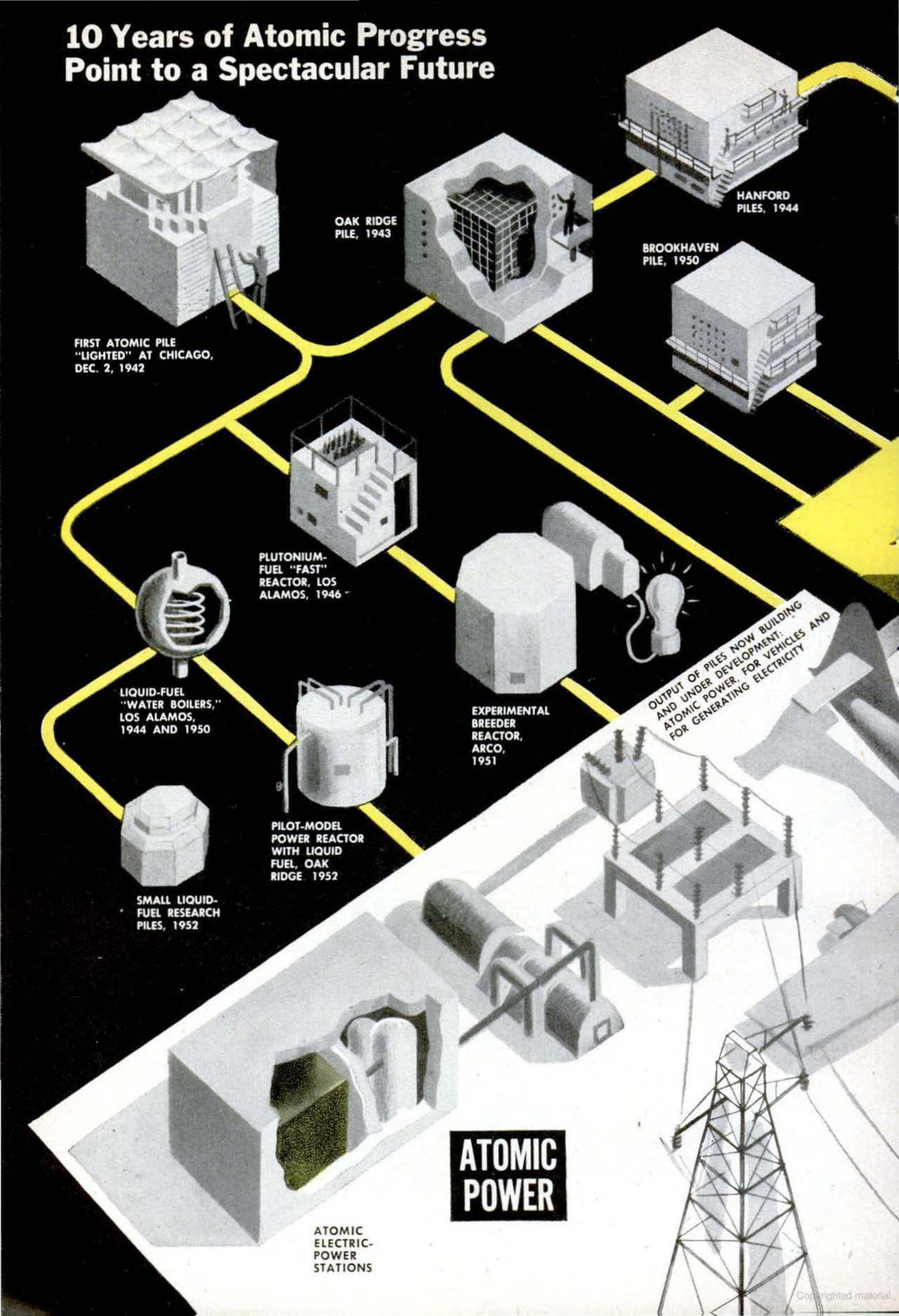
4 HAND JACK shifts center of gravity of gun unit so that it balances on ball-in-socket center support (left foreground), lifting rear. It can then be rotated to any angle.

5 BALANCE IS SO DELICATE that crew (four men are enough) can swing carriage to point the right way. Jack then lowers rear end and hand gear makes final traverse setting.

6 SHELL IS LIFTED by winch, then rammed into breech hydraulically. High-explosive shell weighs 600 pounds. Atomic shell is secret, but must look much like non-atomic one above.

7 CAR-R-ROOM! You know it when this popgun goes off. Actually, noise and shock wave from this shot —a demonstration that sent a dummy slug out over Ordnance Corps' Aberdeen Proving Ground—were milder than most press observers expected.

10 Years of Atomic Progress Point to a Spectacular Future



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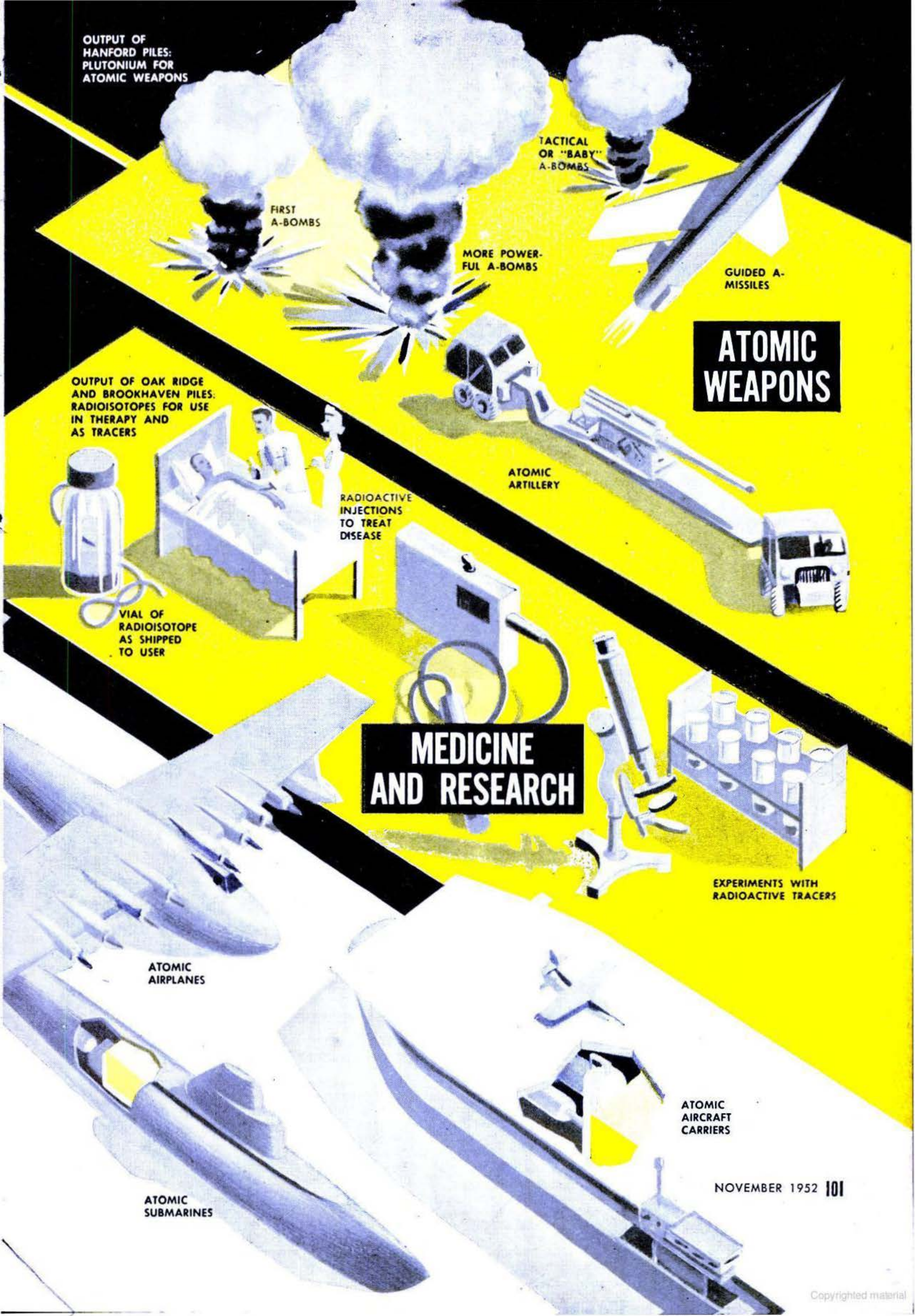

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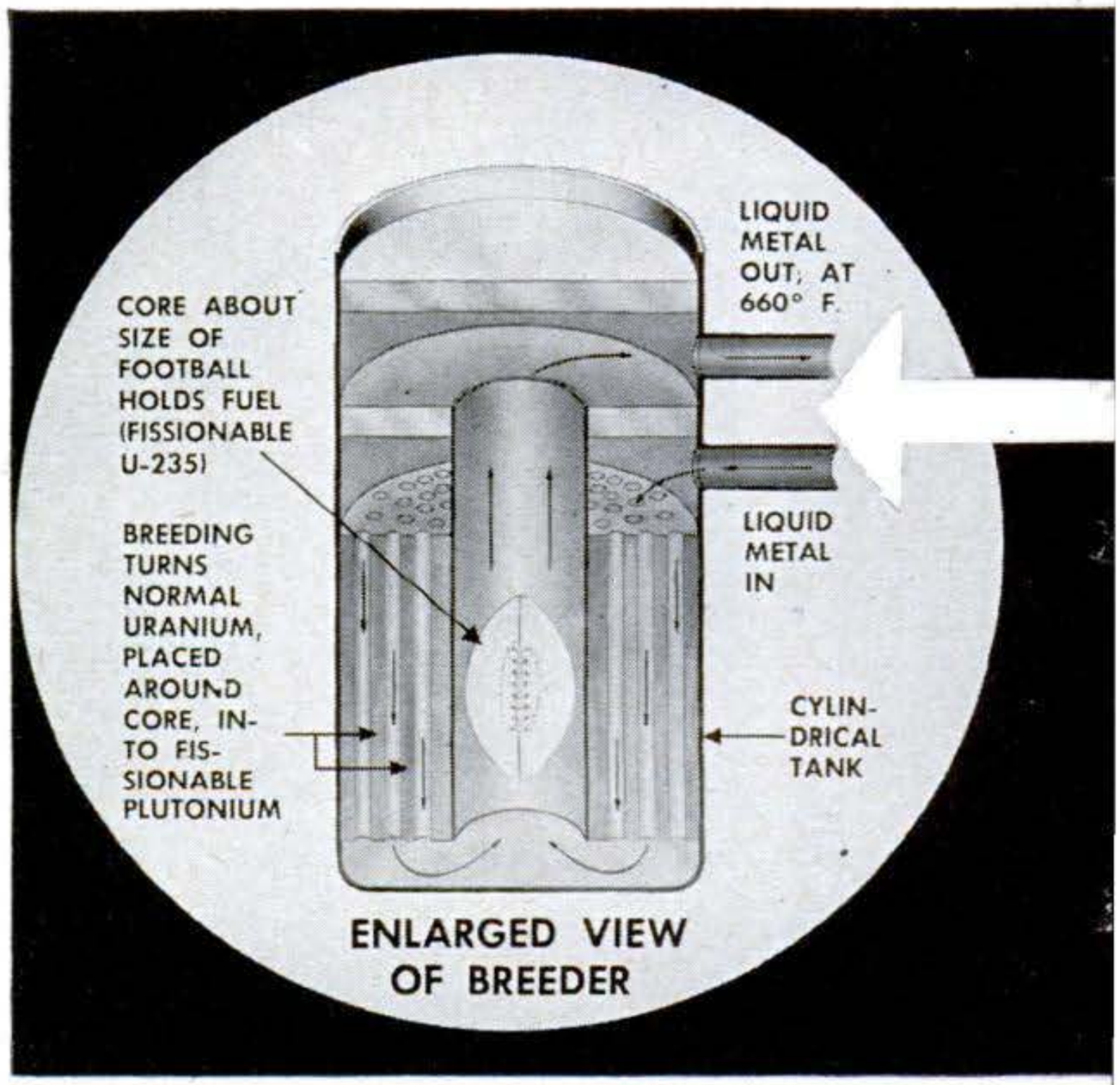
Atomic Furnace Creates More Fuel Than It Burns

Successful "breeding" in pile in Idaho provides the key to large-scale atomic power.

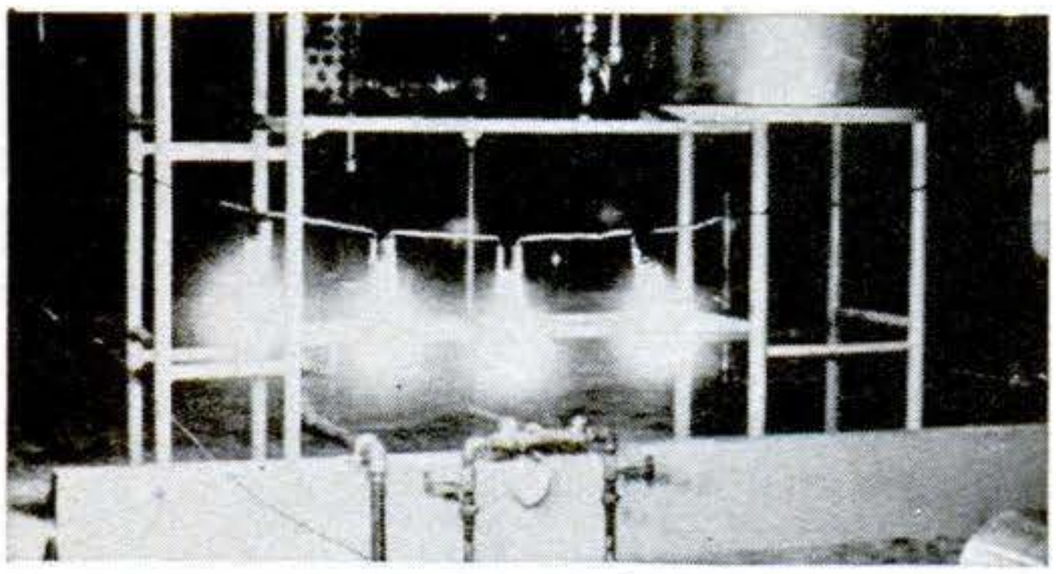
By Alden P. Armagnac

IMAGINE burning coal in a furnace—and then finding in the ash pit more coal than you've burned. Instead of using up fuel from your coal bin, the furnace keeps your coal pile growing.

In a windowless, modernistic-style building at Arco, Idaho, scientists of the U. S. Atomic Energy Commission have sought for months to learn whether an equally fantastic feat (they call it "breeding") will stretch the world's supply of uranium fuel for atomic furnaces. The first pile capable of testing whether their idea will work, the Experimental Breeder Reactor—"EBR" for short—has been in operation there since August, 1951. And now they have their answer. In the words of one AEC expert, trials indicate that "it is actually possible to produce more fuel than is burned." Next step: to determine *how much* more.



Newly released AEC drawings show how ex-



FIRST POWER FROM ATOM lighted these four lamps Dec. 20, 1951. Since then Arco's Experimental Breeder Reactor has produced 100 kilowatts, running lights and machines.

What gives this announcement untold significance is that the hope of large-scale power from the atom has depended largely upon the success of breeding. And how breeding works is best illustrated by EBR itself.

Heart of EBR is a football-size lump of concentrated fuel—the fissionable kind of uranium called U-235, which makes up only 0.7 percent of natural uranium and is extracted from it. There is no conventional "moderator" of graphite or heavy water to slow down the neutrons taking part in the chain reaction. EBR is a "fast" reactor—essentially an atomic bomb with safety controls to

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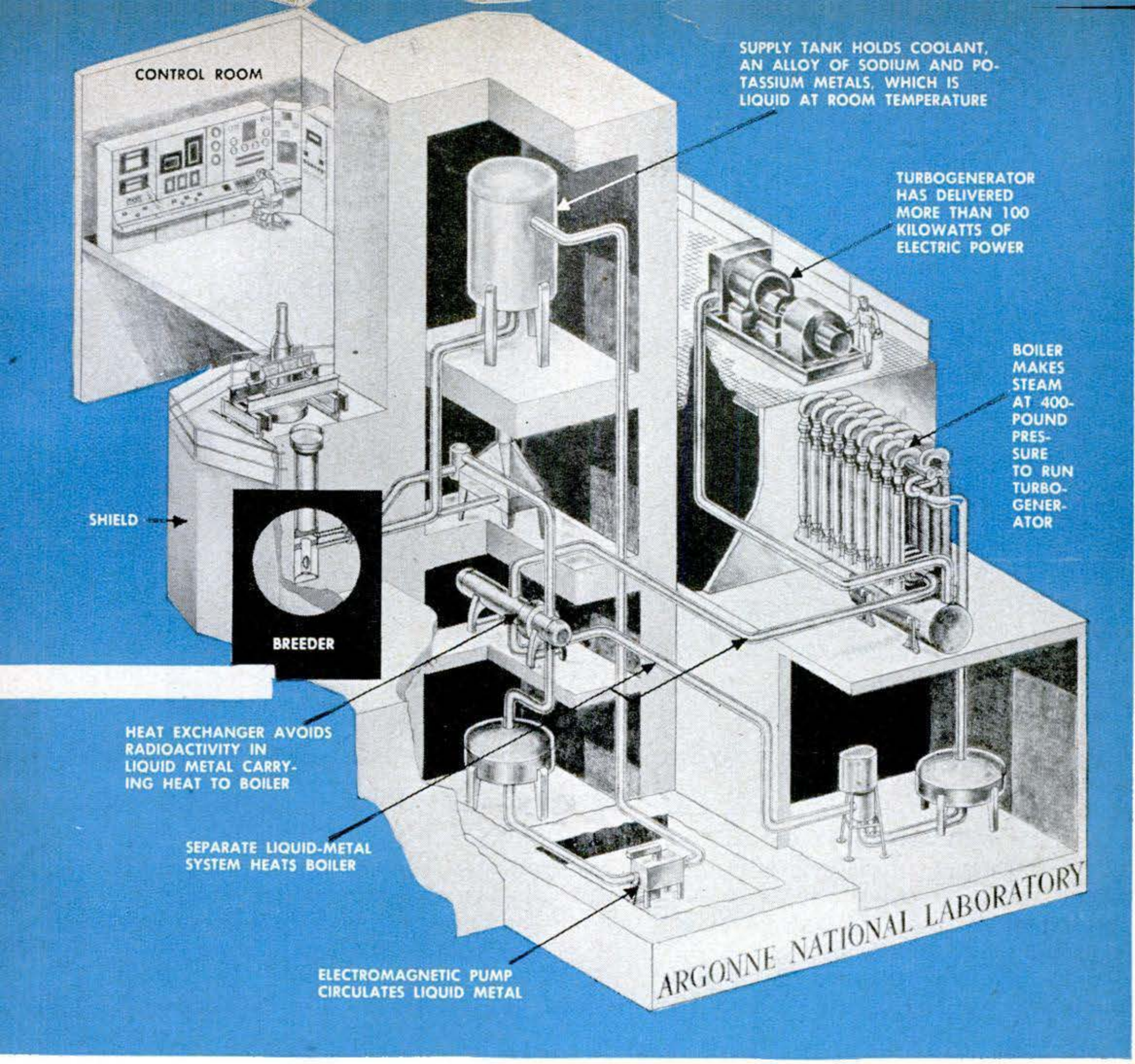

perimental pile breeds fuel and makes electricity. It shows way to large-scale plants.

keep the reaction from running away.

A "blanket" of ordinary uranium, surrounding the core, serves as raw material for breeding. Neutrons whizzing out from the core turn it into plutonium, which is fissionable, like U-235, and may likewise be burned in an atomic furnace (PSM, June '49, p. 124).

What this means is that not merely 0.7 percent of each pound of mined uranium, but *all* of it, can be used as atomic fuel. Further, vast and easily accessible deposits of thorium can be converted into fissionable material, a new and so far untapped source of fuel for atomic piles.

Had the breeding experiments failed, it would not have prevented atomic power from becoming a reality. Already, two atomic-powered submarines are under construction for the U. S. Navy—and now it announces that it plans atomic carriers as well. Atomic planes are on the drawing boards. So great are the advantages of atomic propulsion for military craft, such as enormous range without refueling, that their power plants need not compete with conventional ones in cost of operation. But future large-scale atomic power stations for generating electricity will have to do so. And scientists now believe that they can, with cheap and plentiful fuel made available by breeding. That is the development that caps the first decade of atomic energy. END

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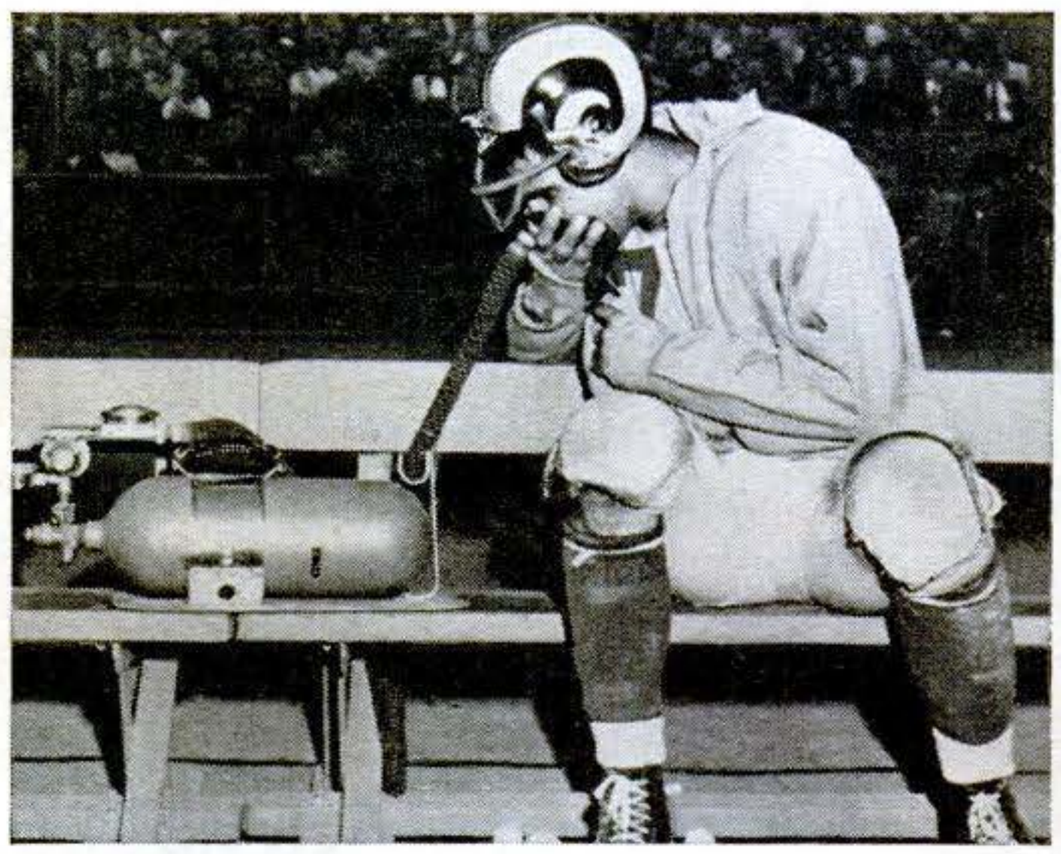
V Joints Hide Nails in New Hardboard Panels

WALLS go up fast with these new tongue-and-groove hardboard panels. Eight feet long, but only 16 inches wide, they're easier for one man to handle than the usual four-by-eight-foot panels. Installed vertically or horizontally, they can be fastened to studs or furring strips. Nails are covered by a V joint where panels meet (inset).

The ¼-inch-thick material is weather-proofed so it can be used indoors or out. The light wood-colored surface is so hard it will not show hammer marks. It can be waxed, varnished or painted. It is expected to sell for about 12½ cents a square foot. The Forest Fiber Products Co., Forest Grove, Ore., makes the Tee-N-Gee panels.

Suit Keeps Polio Victim Afloat

THIS toddler is safe in the water even though she can't swim. A sinkproof bathing suit made of fabric treated to hold air bubbles keeps her floating, always face up. The suit was developed in London for use by polio victims during water treatments.



Oxygen Tank Joins the Team

ATHLETES now take a few whiffs of oxygen from the Vitalator above for a fast pickup after physical exertion. The Mine Safety Appliances Co., Pittsburgh, says inhaling oxygen brings heart and lungs back to normal faster than breathing air.

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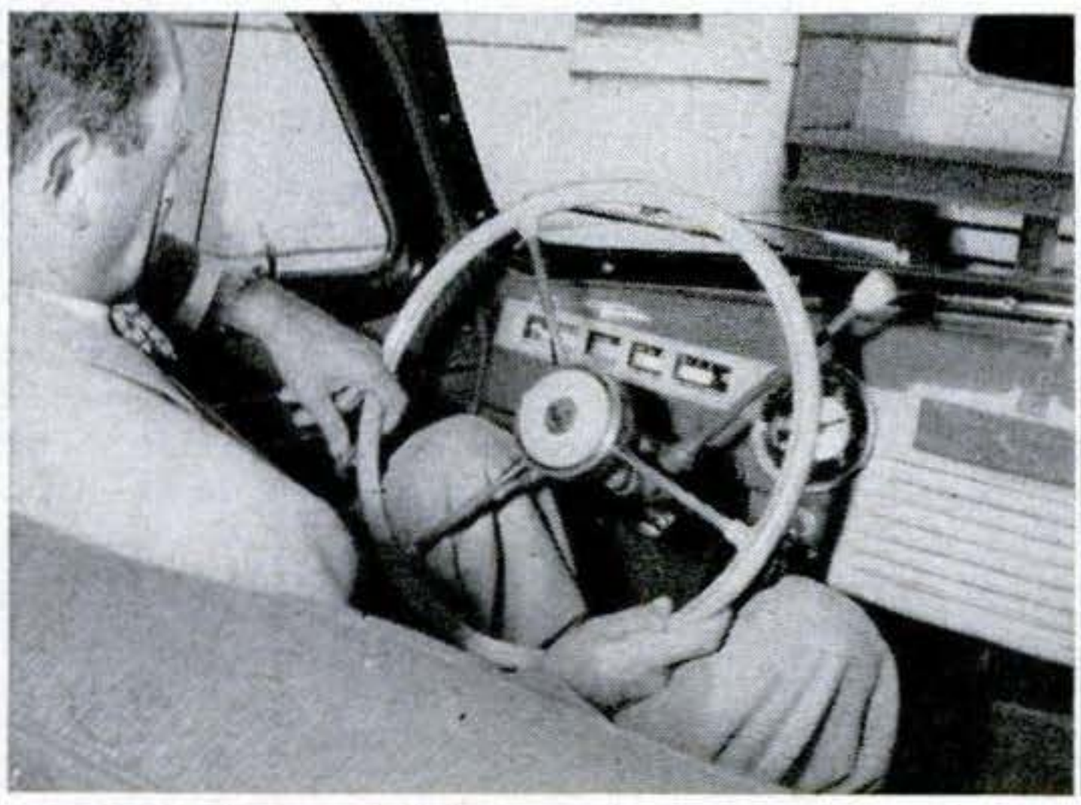
Slotkin with Russian Pobeda (Victory) he slipped out of Finland. The rugged car rides well.

He'd Swap This Russian Car For a Caddie

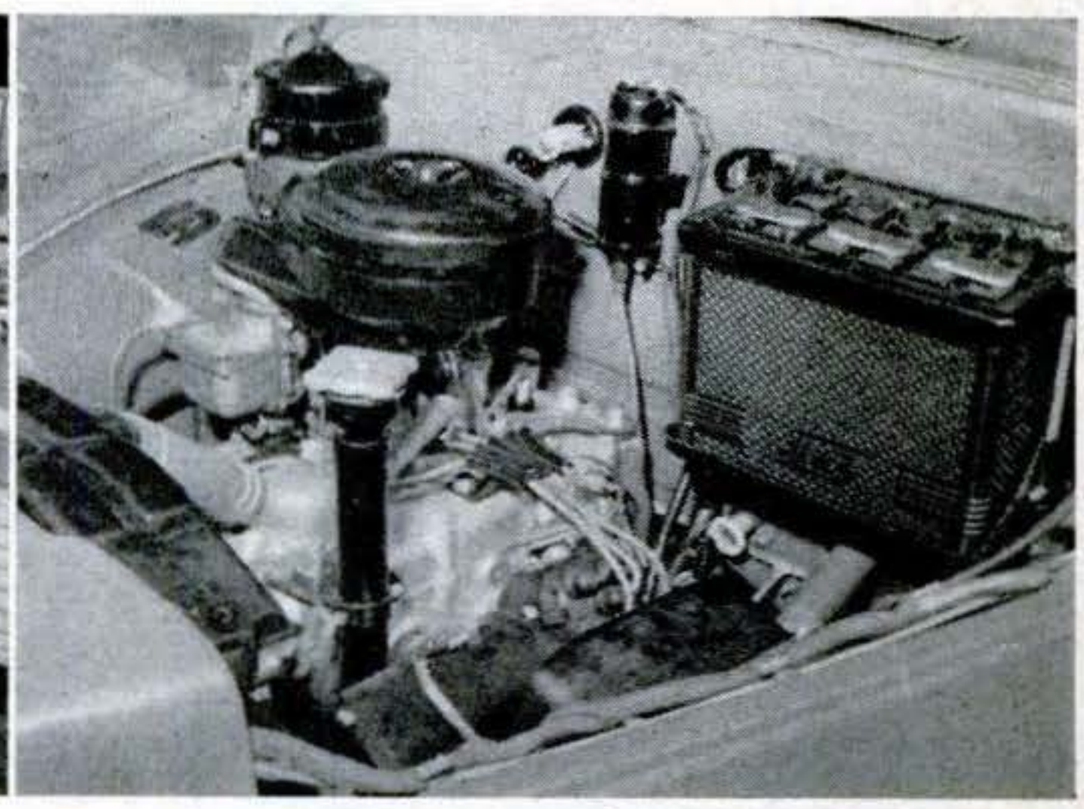
FOR trade: one medium-priced Russian automobile for a Cadillac.

It's still tight, with only 90 miles on the clock. Its four cylinders deliver 30 to 35 miles on a gallon of gas. It's well built. The owner is amazed at its "heavy-car feel."

A Pobeda (PSM, Oct. '51, p. 108), the car was picked up in Finland by Stanley Slotkin, a Los Angeles businessman, for $1,500. He already has one Cadillac and would be happy to off-load the Pobeda for another.



DIALS (left to right) are the ammeter, fuel, temperature, oil-pressure and speedometer.



FOUR-CYLINDER ENGINE has 13-volt battery, starts in flash on U.S. gas. It has its own light.

FLOORMATS cover rubber pads. Cushions feel like sponge rubber. Upholstery is good.

TURTLE BACK resembles the prewar Ford. Note height. Defense experts are to study car.

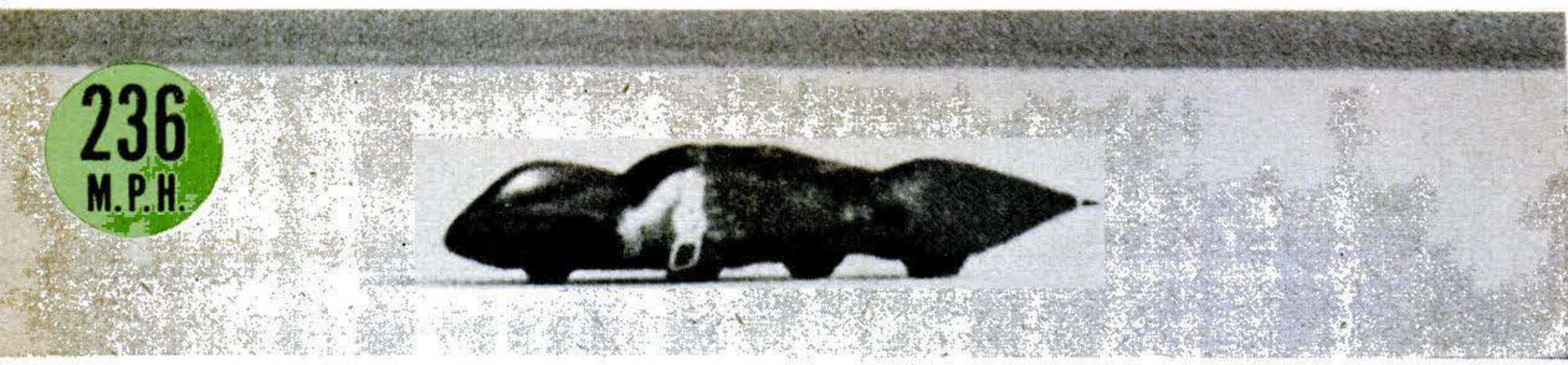
7 Hot Rods Beat 200 M.P.H.

Fastest homemade racers at Bonneville, Utah, led pack of 300 with Mercury and Chrysler V-8 engines souped up seven ways.

THE world's hottest hot rods are seven cars with souped-up stock-car engines that recently streaked faster than 200 miles an hour across the sun-baked salt flats at Bonneville, Utah. You see them all here, most of them photographed at the scene of their triumphs. Los Angeles fans will get a closer look at them this month, when they will be on display at the city's third annual Motorama, Nov. 10 to 16.

These particular masterpieces of backyard engineering, fastest of the more than 300 cars entered in the Bonneville events on Labor Day week end, were all powered by modified Mercury or Chrysler V-8 engines. Three used direct fuel injection in place of carburetors. One was pretested in a Caltech wind tunnel, where a scale model proved that wind would not roll it over or somersault it even at top speed.

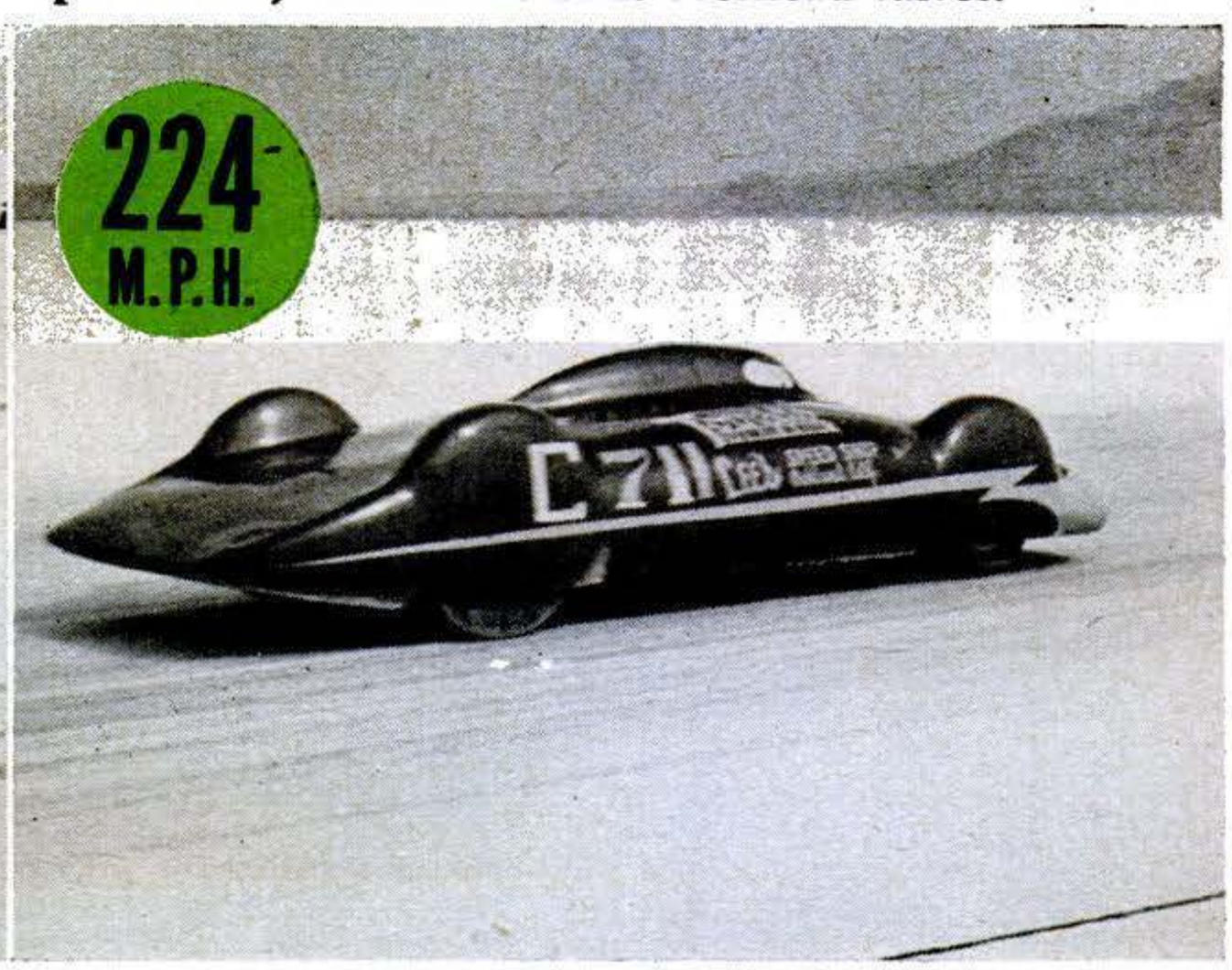
Tiniest entry at Bonneville was a 760-pound streamliner with a body of glass fiber that clipped off 137 miles an hour with a converted motorcycle engine.



MOST RADICAL-LOOKING CAR, its design pretested in a wind tunnel, was one above. It had a reworked Chrysler V-8 engine with fuel injection, displacement of 350 cubic inches.

RUNNING AS A V-8, with 248-cu.-in. displacement, No. 61 was third in speed. Its owners then blocked off two cylinders of the Mercury engine and hit 191 m.p.h. as a V-6.

ON ITS FOURTH TRY in four years, car below managed to exceed 200 m.p.h. Owner had fitted modified Mercury engine (295-cu.-in. displacement) with home-built overhead valves.



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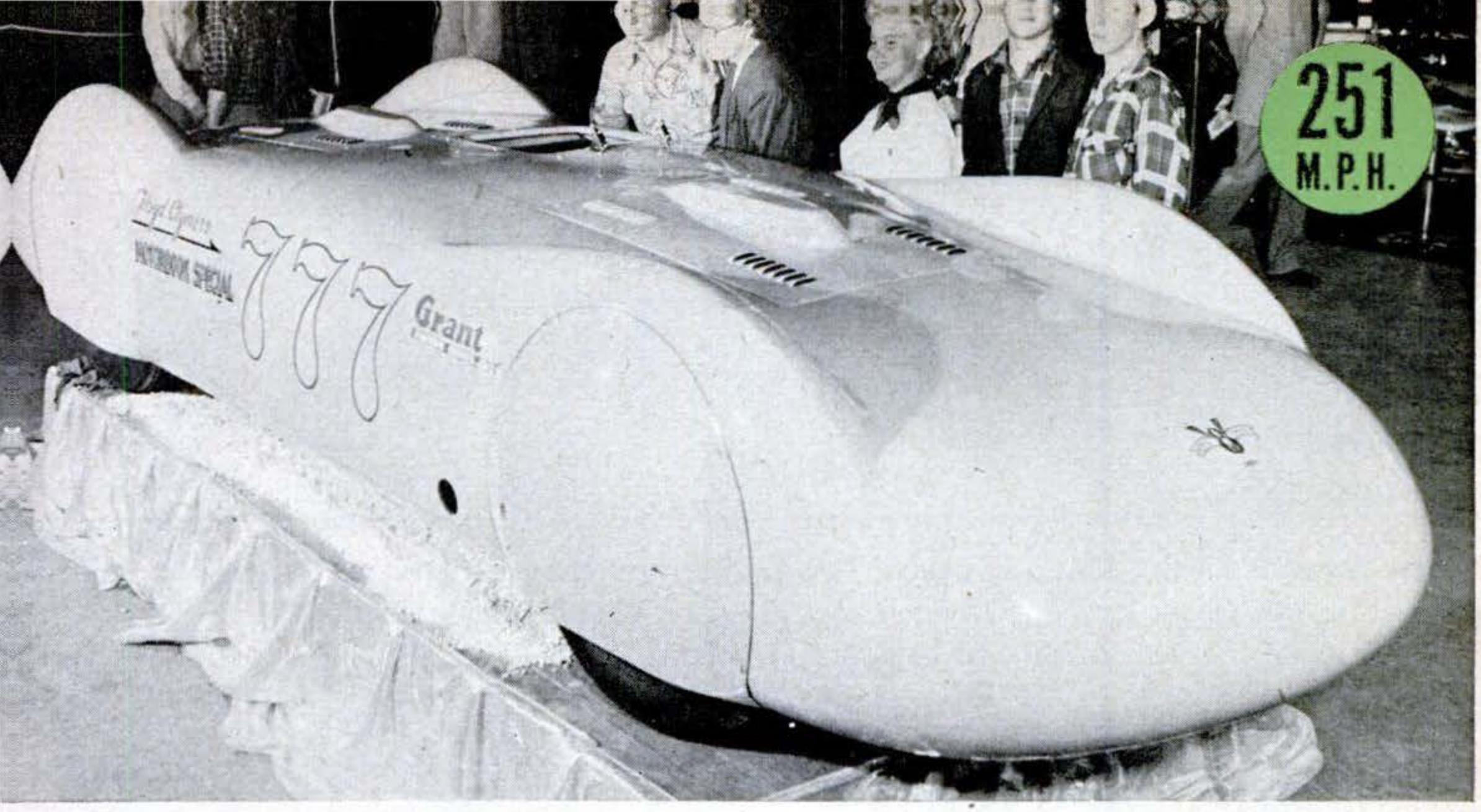
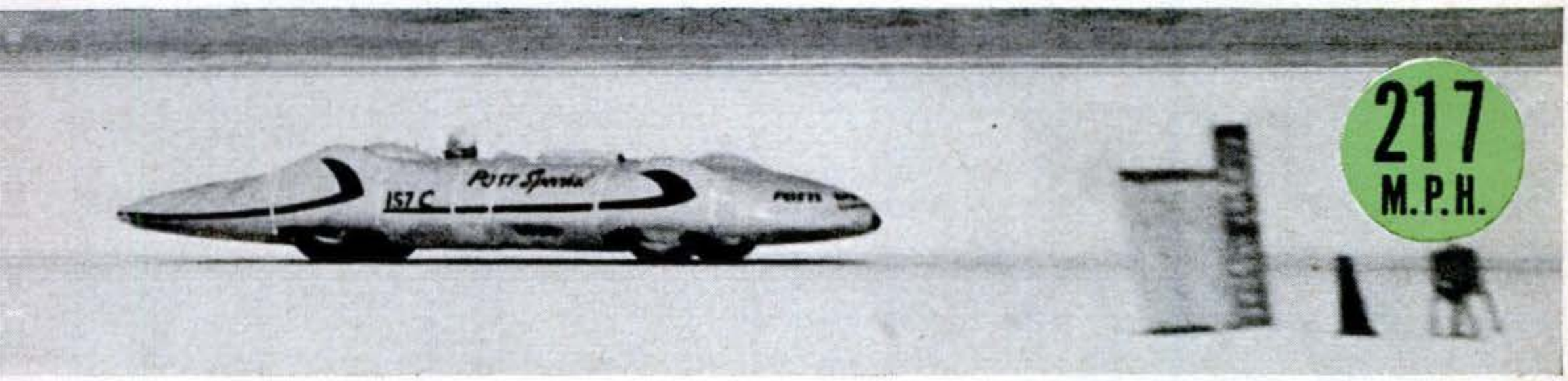


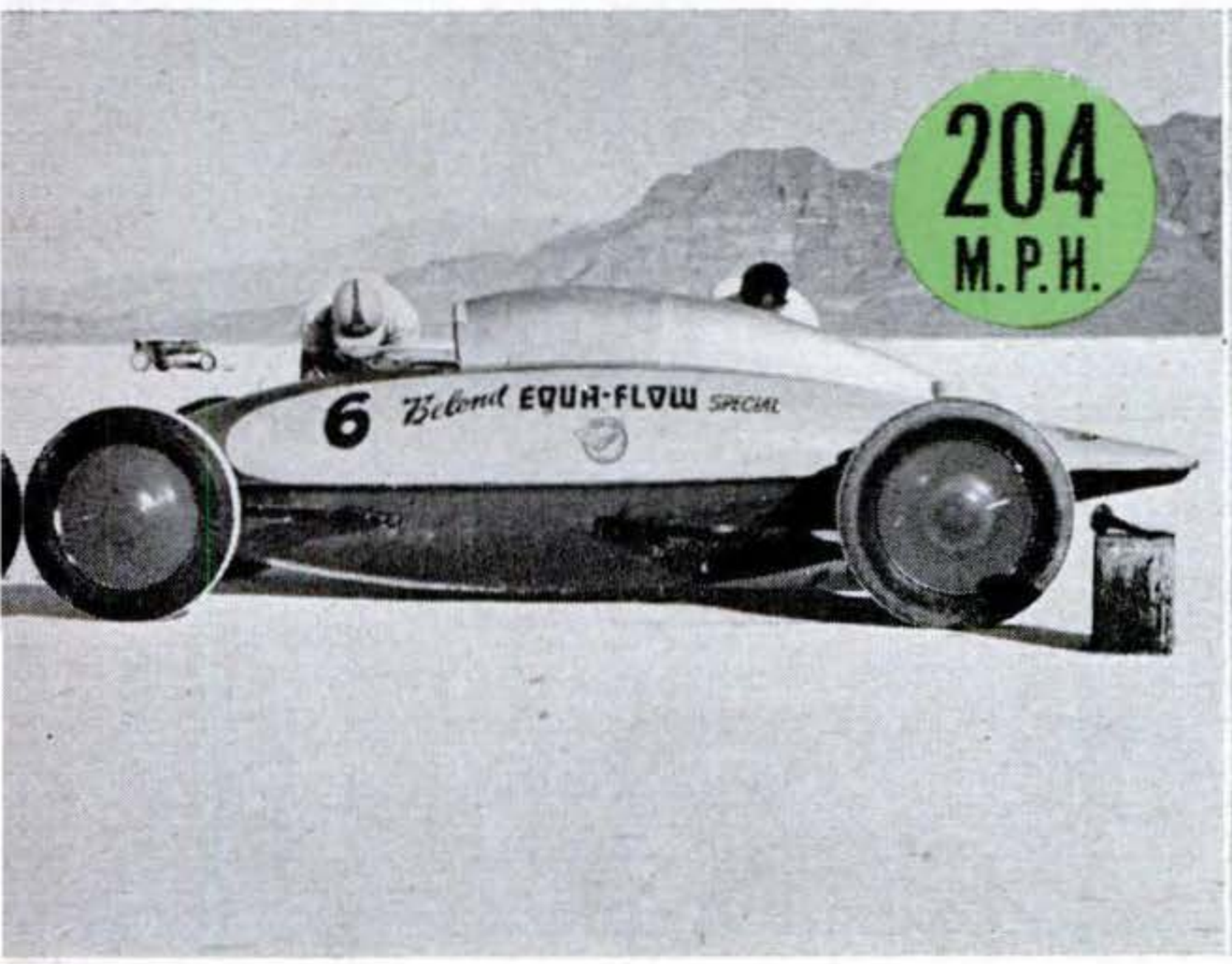
SECOND-TIME WINNER, No. 777 bettered its own 1951 top speed by 20 m.p.h. This year it was powered by two modified 1948 Mercury V-8s. Total engine displacement: 590 cubic inches.

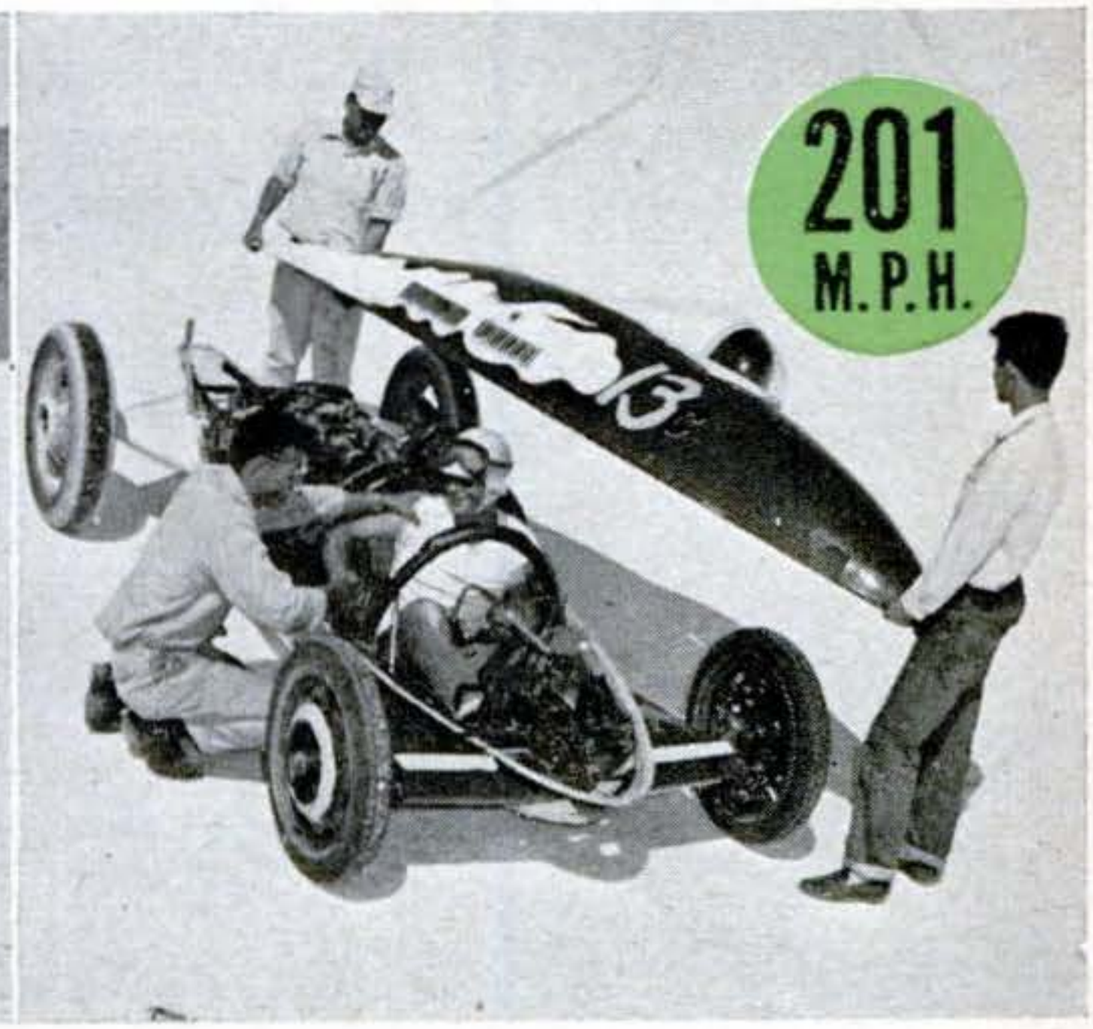


SOUPED-UP CHRYSLER EIGHT with displacement of 304 cubic inches drove this 20-foot aluminum shell, fitted to a chassis of light tubing, to fifth place in the trials.

A HORSEPOWER BOOST to 300 was given the sixth-place speedster below, whose Mercury engine carried a blower for the purpose. The engine displacement was 295 cubic inches.

JUST UNDER THE WIRE in the over-200 club, car below was driven by a Chrysler V-8, its displacement cut from 331 to 304 cubic inches. *(Photos from* Hot Rod *Magazine)*





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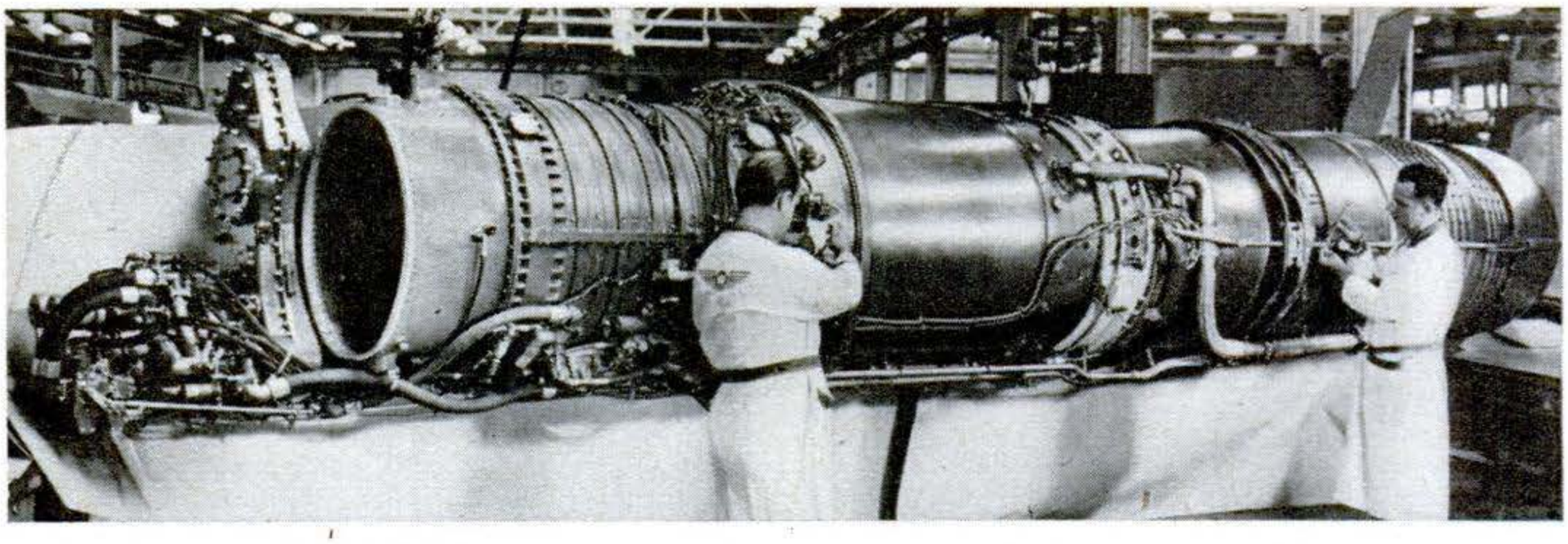


Slim New 25,000-Horsepower Jet to Speed Navy Fighter Planes

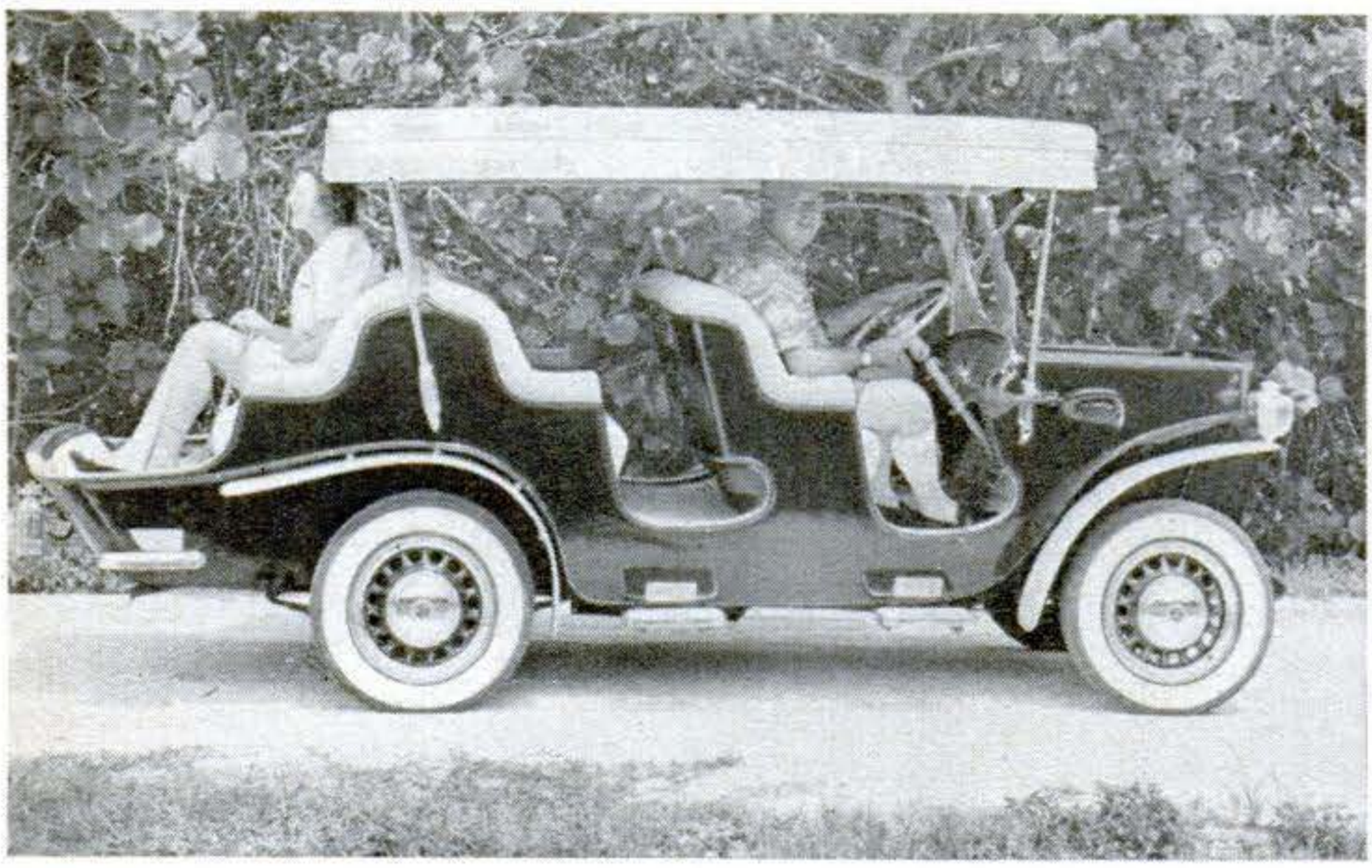
THE world's most powerful turbojet is the title claimed for the new J-40 engine. Twenty-five feet long and 40 inches in diameter, the slim jet job delivers, at high speeds, the equivalent of 25,000 horsepower—2½ times the combined thrust of all four piston engines of a B-29. Yet the jet weighs 3,500 pounds, less than one B-29 engine, including the prop. The J-40, an outgrowth of an earlier model announced last year, was developed by Westinghouse and the Navy to power such new jet fighters as the McDonnell F3H Demon and the Douglas F4D Skyray.

See Who's Talking . . . on Phone

THE television telephone was introduced to Britishers at the 1952 Radio Show in London. The device enables the user to see as well as hear the person at the other end of the line. The new TV phone is about the size of a kitchen cupboard.

Since the present cost is around $2,800, it probably will not be in common use within the near future. But the maker, Pye of Cambridge, suggests that it will be valuable in industries where plans and documents have to be explained over the phone. And it may be installed in hospitals, where doctors might find it useful in making long-distance diagnoses.

Motorized "Surrey" Meets Bermuda's Strict Auto Specifications



BUILT to run like a car but looking more like an old-fashioned surrey, this "horseless carriage" was designed by Wendell Anderson of Grosse Pointe, Mich., and Paget, Bermuda—and made in England—to conform to Bermuda's unusual regulations regarding autos: Maximum length 166 inches, width 64 inches, horsepower not to exceed 14. Speed limit: 15 m.p.h. in town, 20 in country.

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This three-wheel convertible with an improvised side-sliding seat pleases Nashville postmen.

How Should a Mailman Carry the Mail?

Faster, cheaper delivery is expected soon, as Post Office tries out 39 ways of taking the load off postmen's feet.

IN NASHVILLE, Houston, Miami, Milwaukee and Washington, people never know whether the day's mail will arrive on two, three or four wheels. Those cities are test laboratories for the Post Office Department, which is trying out 39 kinds of vehicles in an anxious attempt to get out from under the biggest load of letters and packages in history—50 billion a year.

Faster delivery is essential. Cheaper delivery would soothe the taxpayer. Easier delivery would be nice for the tired feet of 113,000 over-burdened carriers.

Some postmen seem doomed to get along in the old-fashioned way. They are the ones whose daily beats lie along crowded city sidewalks and through countless revolving doors. But for those who carry mail to suburban homes there

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A size to suit any mail route is available in this sample line-up of vehicles now undergoing

seem to be many kinds of relief in sight.

In the five test cities, selected because they provide samples of nearly every variety of U. S. climate and terrain, postmen are pushing 24 types of handcarts. Some look like the carts built for toting golf bags. Some look like the wheeled wire baskets you see in supermarkets. There's even one that resembles a tiny hospital stretcher table. But they are all capable of taking at least 100 pounds of mail off the postman's back.

Of the 15 kinds of motor vehicles being tried out, most are three-wheel scooters, carrying up to 400 pounds of mail. Small automobiles (Kaiser's Henry J is a favorite) still appear to be best for special delivery and for sprinting mail to and from airports.

COLLAPSIBLE HANDCART (below) can be carried back to the post office on a bus when the mailman has emptied its bulging pouch.

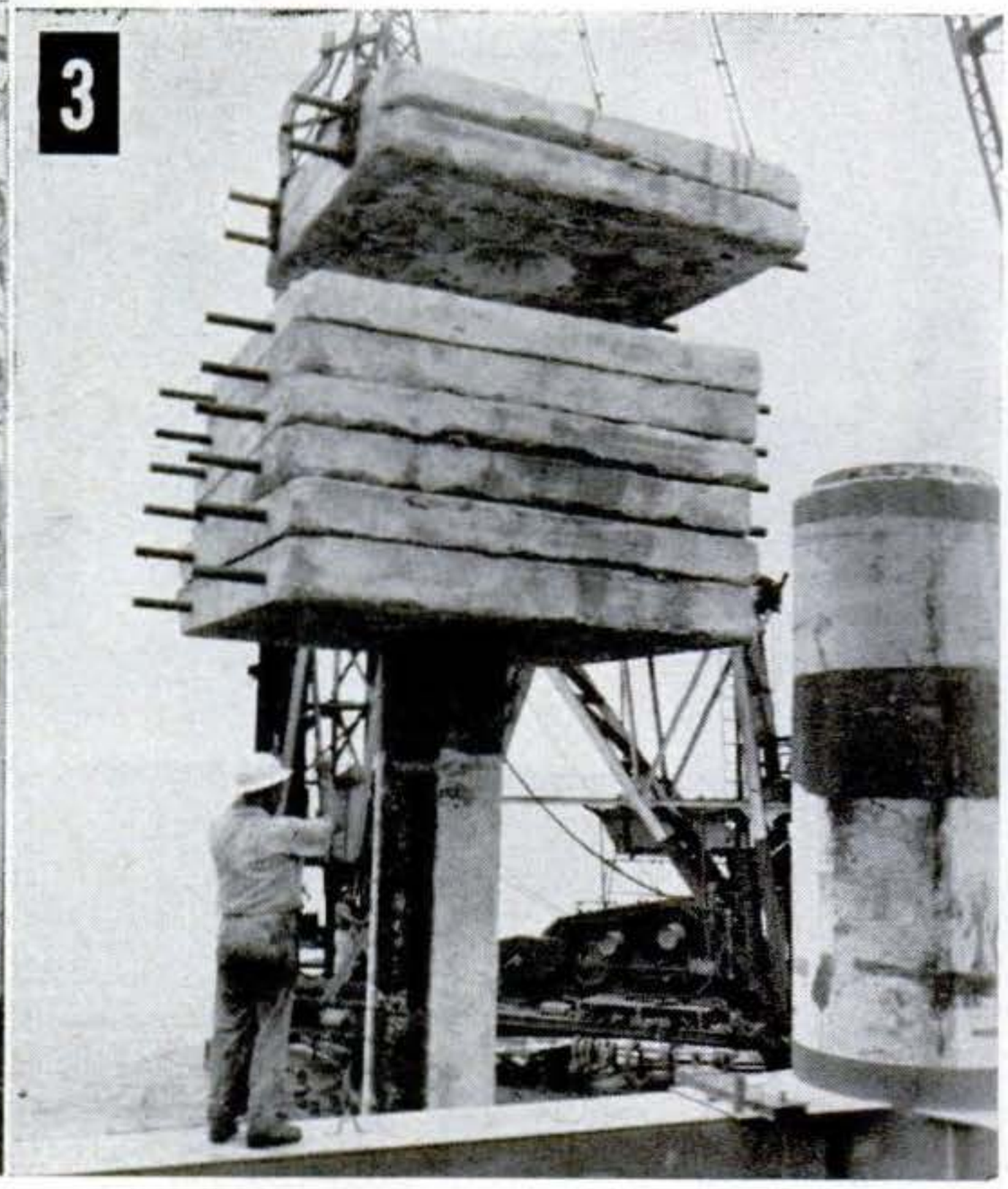
test. Such research has saved taxpayers $4,500,000 in two years, reports the Post Office.

IT'S CHEAPER, though slower, to collect mail from neighborhood boxes with a pushcart like this one than to have trucks do the work.

BUG-EYED SCOOTER, popular except on rainy days, carries 400 pounds of mail to speed up suburban deliveries. *All photos from* Business Week.

Rocket Ship? Nope, Just a Way of Getting Crude Oil

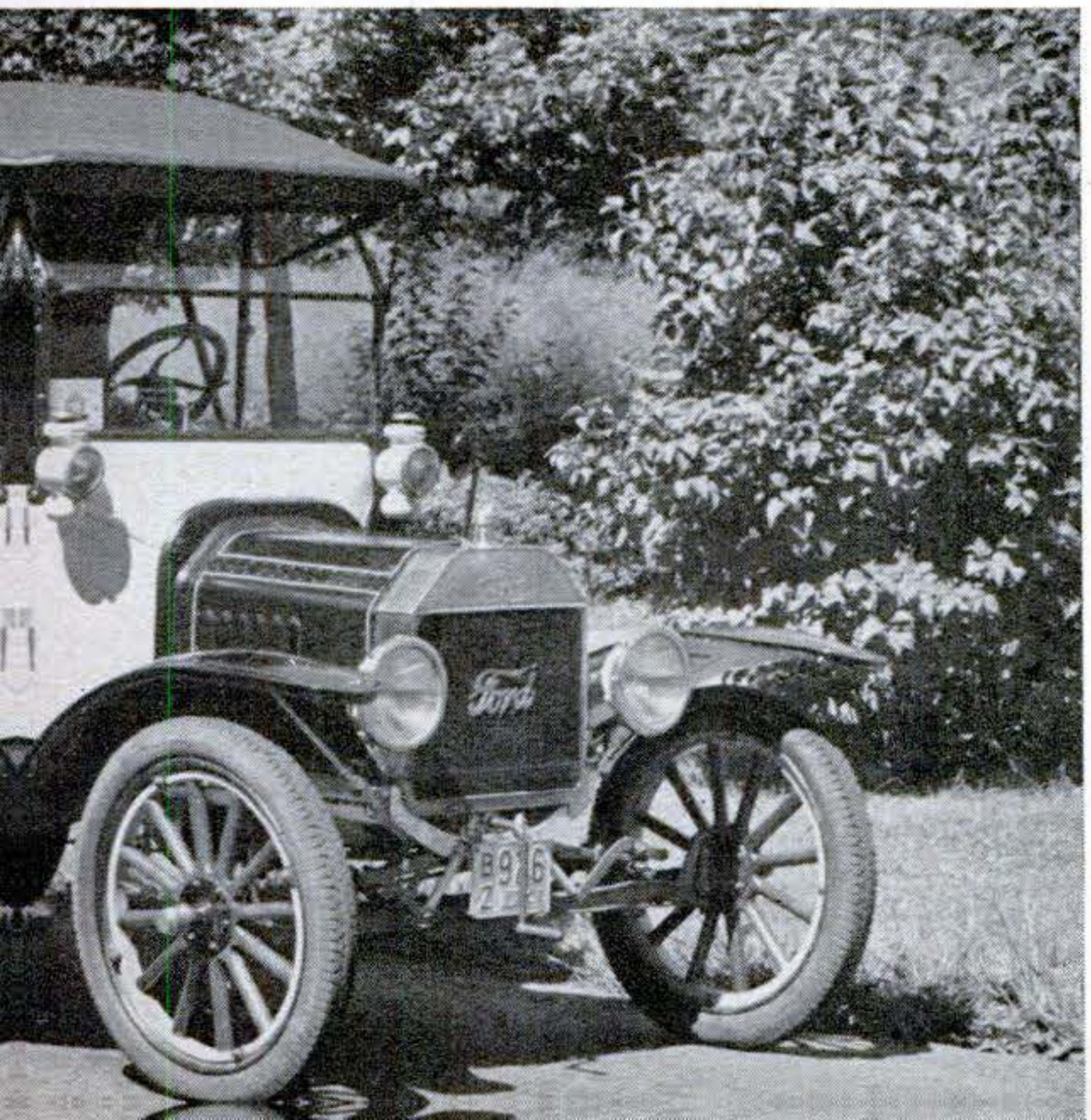
To GET at rich oil reserves under Venezuela's vast Lake Maracaibo, engineers are sinking 90-ton steel-and-concrete caissons into its bed. These support platforms for drill derricks. Hollow, the caissons (1) are floated out into the lake as far as 36 miles from shore, up-ended by block and tackle (2) and filled with water to make them sink. Finally they are weighted with several hundred tons of concrete slabs (3) to drive them into the lake bottom.



Great Britain Shows Off Radar-Packed "Atom-Bomb Destroyer"

THE delta-wing airplane above, looking like a giant beetle in a nightmare, is England's latest jet fighter. Called the Javelin, it is designed to destroy enemy atom bombers that venture over the isles.

Packed with radar equipment to hunt down hostile planes, the twin-engine fighter has "longer range than is usual in a jet," a speed in excess of 700 m.p.h. at sea level, and a ceiling higher than eight miles. Yet it has an "unusually low landing speed." Its armament is secret. Its wing span is 52 feet, length 57 feet and height 17 feet. A tail parachute shortens the landing.



Honk, Honk! Here Comes the Tin Lizzie Club

THE picture at the left looks as if it might have been taken 40 years ago, doesn't it?—except for the clothes on the gents standing beside the Tin Lizzies.

The fact is that these cars were snapped just the other day at a meeting of the Connecticut Valley Model T Ford Club. The five members of the club all together own eight Model Ts. They range from a 1910 touring car to a 1923 roadster.

The cars are kept spotless, from paint to wrist pins. They're still sturdy, too. Recently the members of the club drove their mounts on a three-day-long tour.

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Shifting house positions and varying colors, shrubs, doors, windows and carports disguise

Ready-Made City Will

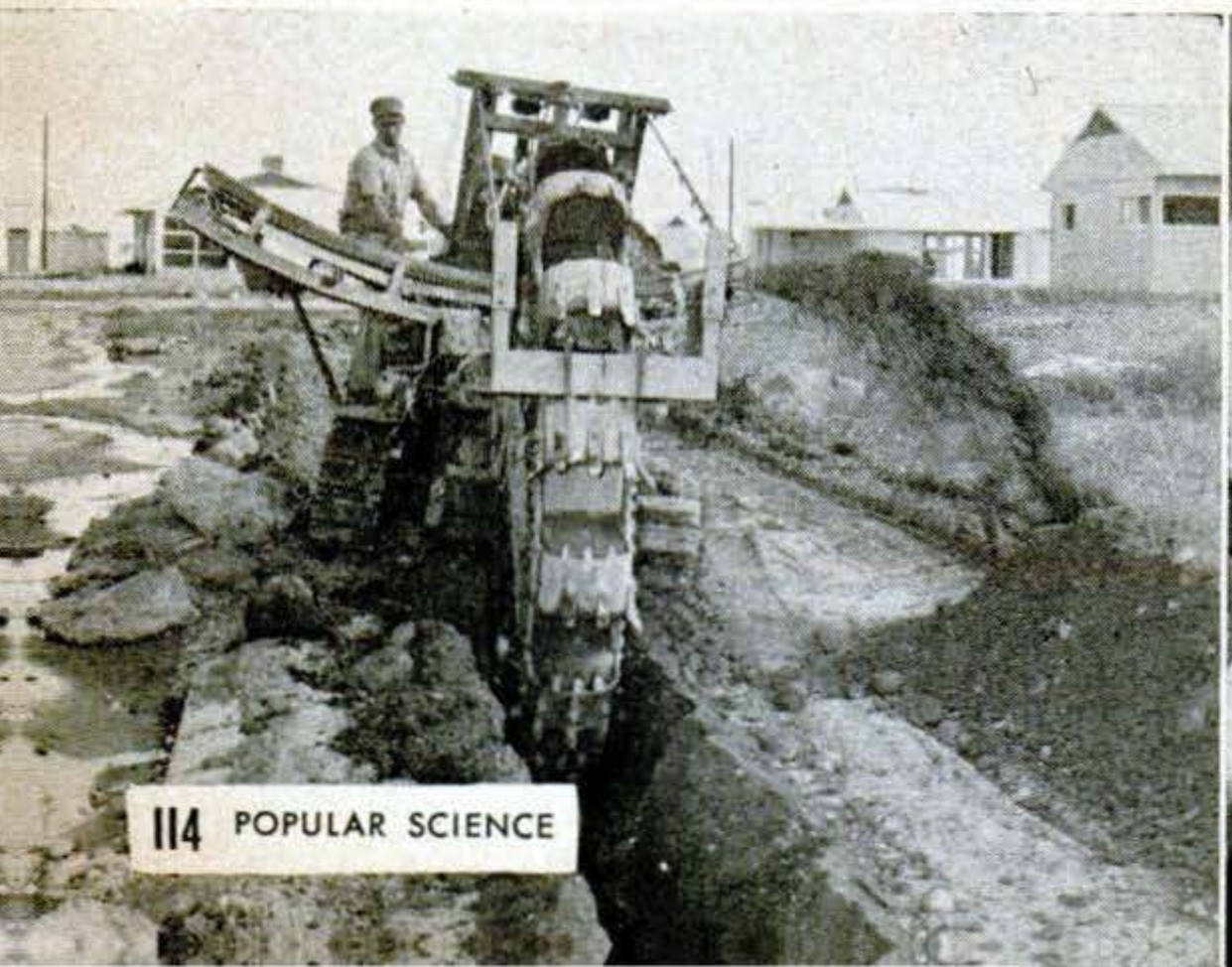
Two hundred homes a week are springing up on 5,200 Pennsylvania They're mass-produced, but clever camouflage

By Don Weldon

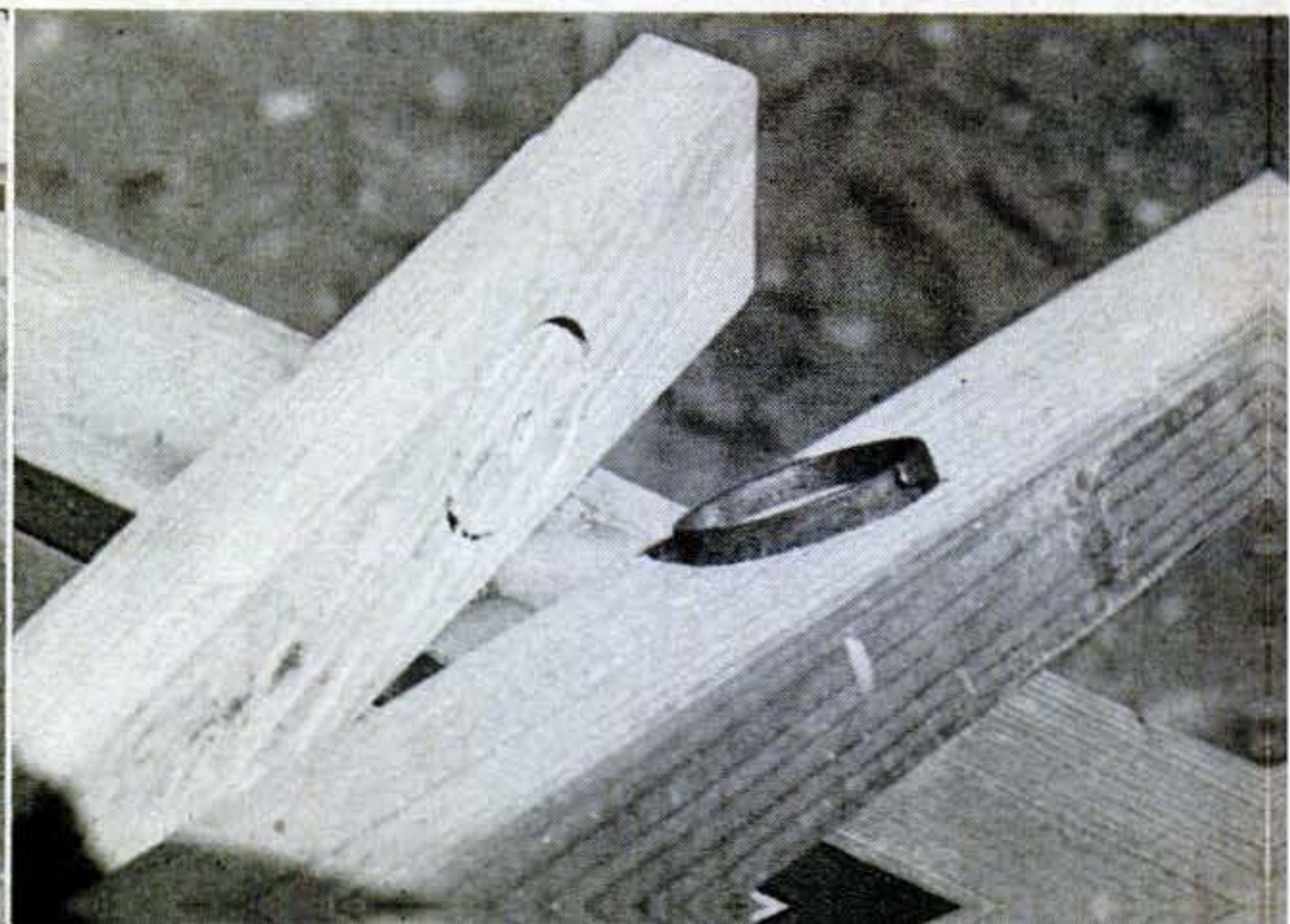
THE biggest optical illusion in 48 states is rapidly taking form 25 miles north of Philadelphia.

On a plot of farm land where scarcely 100 people lived and grew spinach last year, 16,000 homes will house an estimated population of 70,000—Pennsylvania's tenth largest town—year after next. Levittown in Bucks County will be standardized to a degree never before attempted, to cut costs and add comfort to a mass-production house, but its uniform-

TRENCHING MACHINE cuts a channel for electric mains. A smaller version chews out ditches for concrete-slab footings. Heavy-duty equipment worth $1,000,000 is at work on town.



STRONGER THAN 12 NAILS is this special ring and bolt beam fastener. Ring, embedded between bolted members, takes much of the stress off bolt and has great holding strength.



carbon-copy construction of new Levittown.

House 70,000

acres that last year grew spinach. conceals their uniformity.

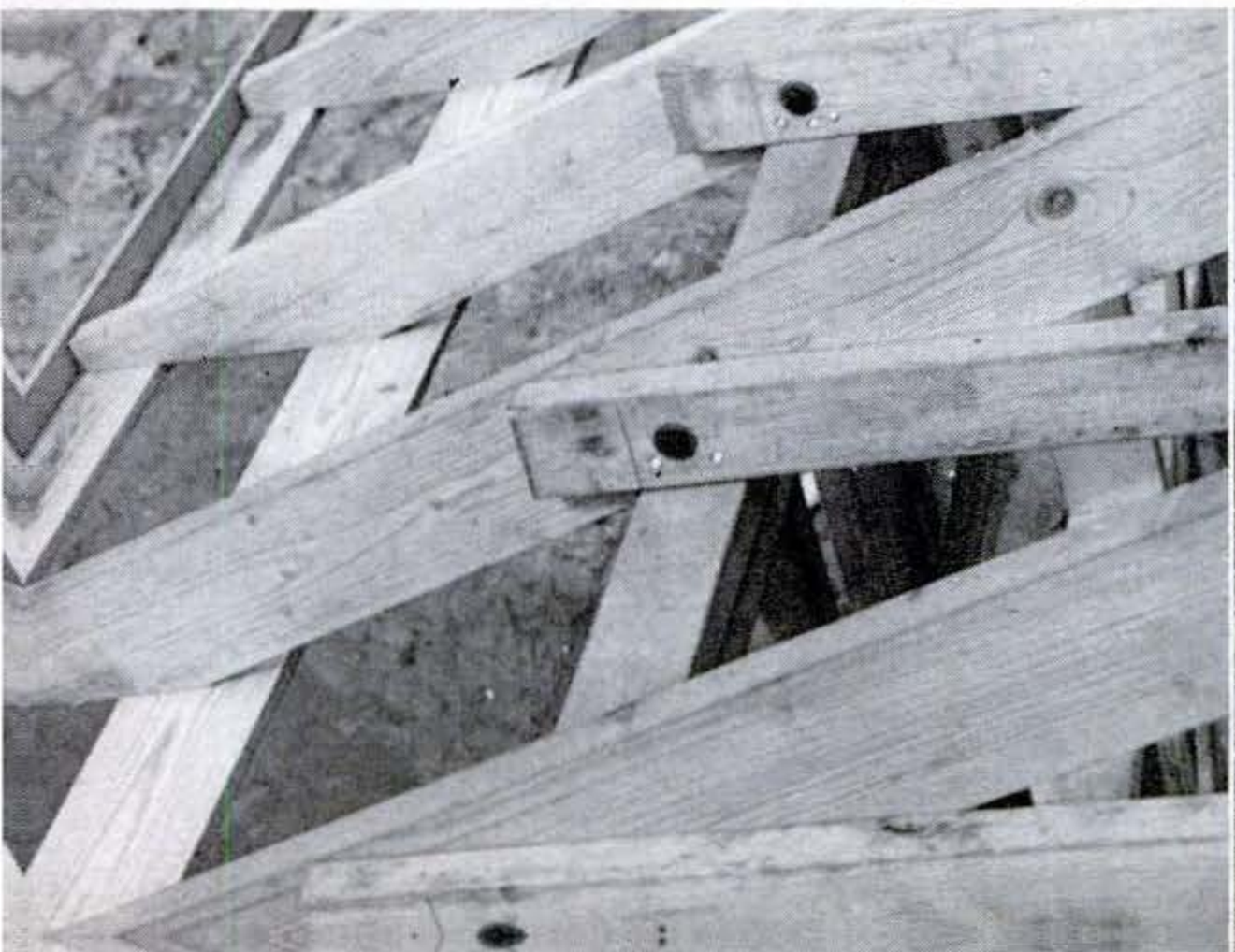
FRAMES FOR TWO HOUSES, cut to size, are piled on each truck, delivered to adjoining sites.

ity is so cleverly camouflaged that you can't see it even if you're looking right at it.

All 16,000 buyers in the development will get a packaged machine for living at a bargain-basement price, but without a basement. The new Levittown is virtually a one-floor town, since attics are also omitted, except in 1,500 de luxe units. No one will have gas facilities, but no one will have anything to use gas for, since everyone will have an electric range and refrigerator, an automatic washer, and radiant oil heating. Every owner is

SELF-SUPPORTING ROOF eliminates weight-bearing partitions in every house. Rafter trussing (below) gains strength from use of 60 to 80 of ring bolts shown on opposite page.

LARGE SHEETS OF PLYWOOD, used for both roof and wall sheathing, provide a tight, rigid base for asbestos siding, besides saving 40 man-hours on each house.



LARGE CLOSETS have split-bamboo curtains on ceiling tracks in place of doors, making them easier to get at and giving the housewife more leeway to shift furniture.

BAMBOO CURTAIN permits kitchen to be closed off during cooking, then opened wide for easy serving to dining area. House's oil burner is at far right, next to the washer.

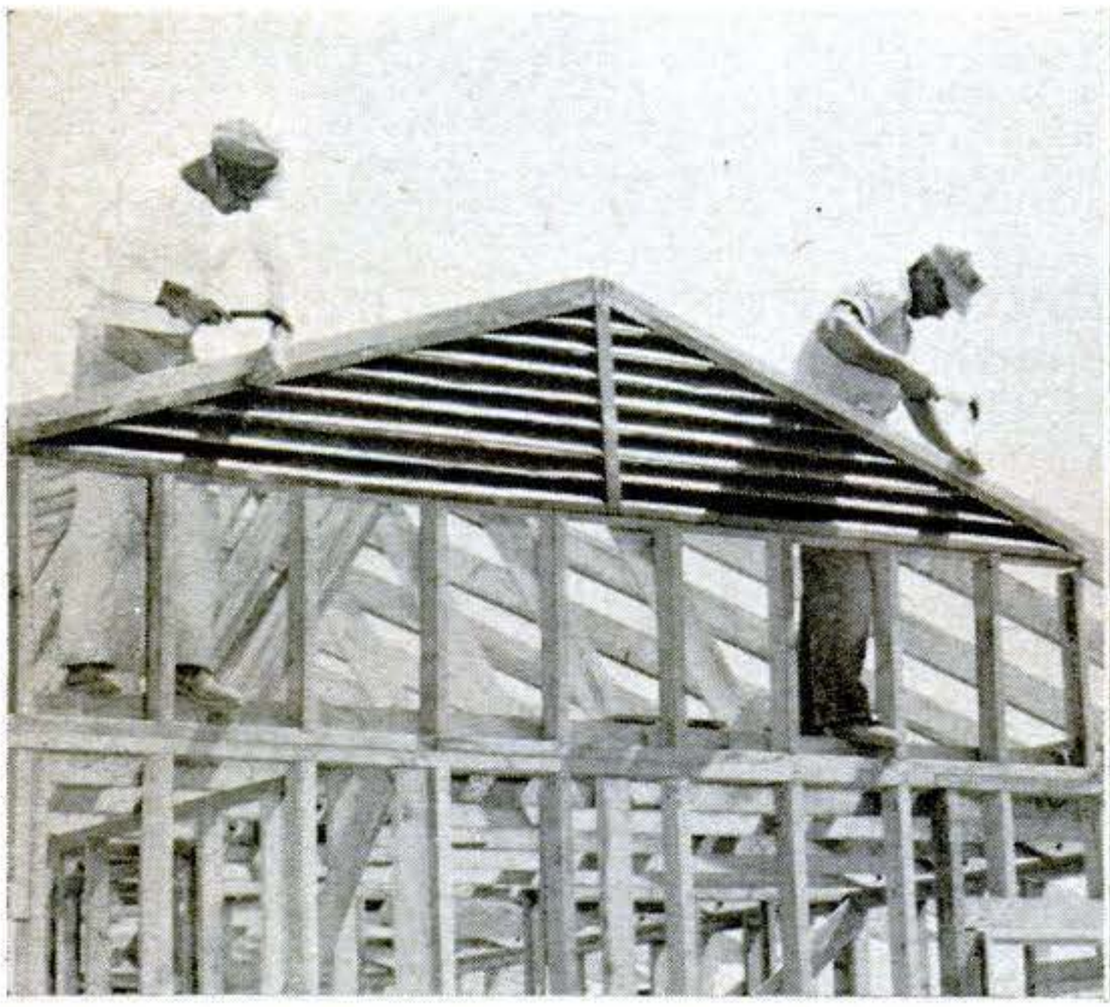
allotted seven eight-foot storage closets, but no one has a closet door. (Split-bamboo curtains on ceiling tracks make it easier to get in and out and use up no extra wall space when open.)

Pennsylvania's Levittown is the only city in the country where a paperhanger would starve to death—interior surfaces are coated with a new wall enamel which gives promise of outlasting the house. Moreover, only one color combination is allowed: dark green flecks on a cream background.

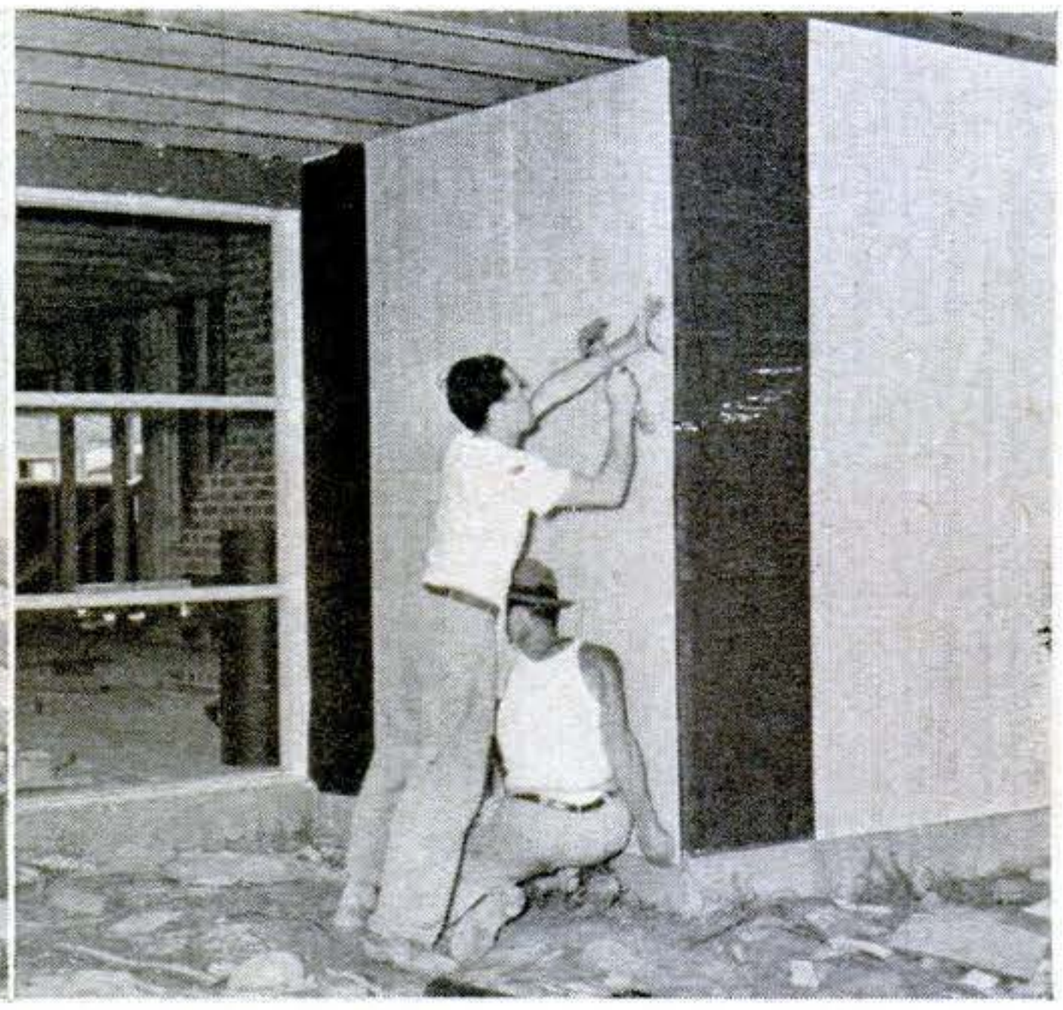
But if Levittown represents regimented living, then hordes of sales prospects are clamoring to lose their individuality and gain identical luxuries, such as the three-way fireplace, "borrowed" from Frank Lloyd Wright, and 109 square feet of double-glazed picture windows, standard equipment in every $10,000 model.

200 Houses a Week

These houses are being completed and occupied at the unprecedented rate of 200 a week, with a two- to six-month backlog of orders, while competitive builders tear their hair trying to come within $1,000 of the price, even without the 30-odd extras which large-scale production economies enable Levitt & Sons to include.



FULL VENTILATION for the three-foot space under the roof is insured by copper-screened louvers 12 feet wide at the base. Houses have glass-fiber and rock-wool insulation.



GIANT SLABS of asbestos-cement siding, three by eight feet, take the place of the usual one-by-two-foot shingles. They look neater, provide more protection and slice costs.

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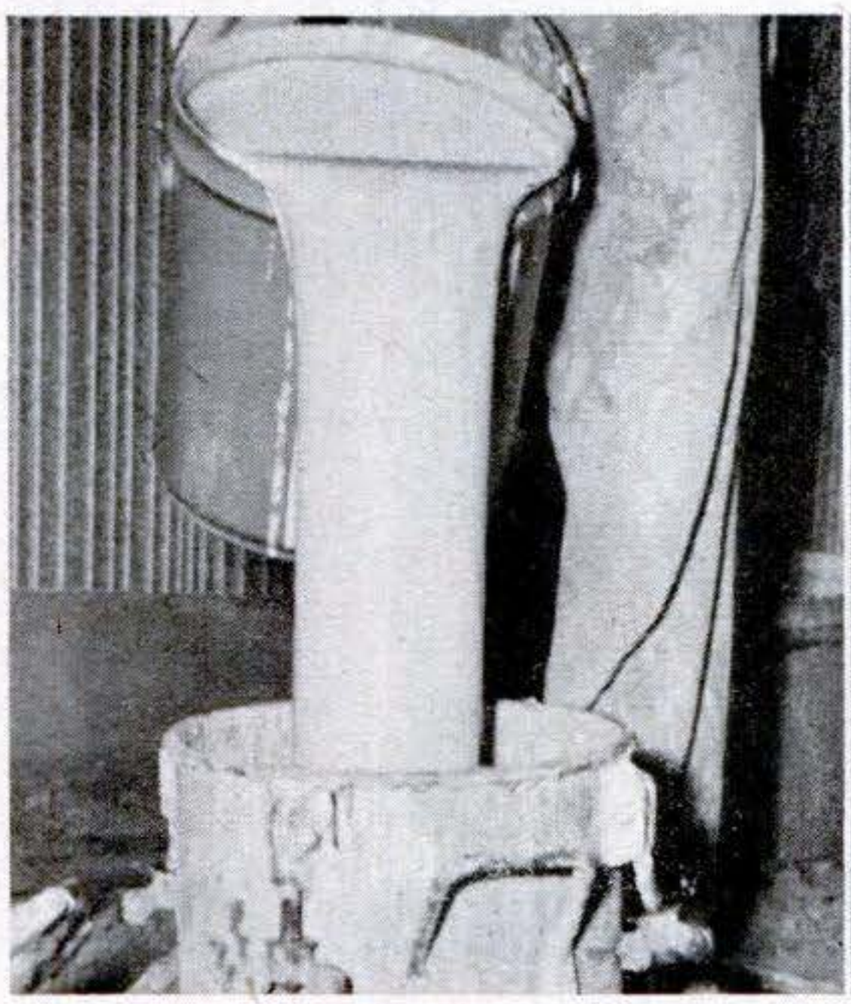
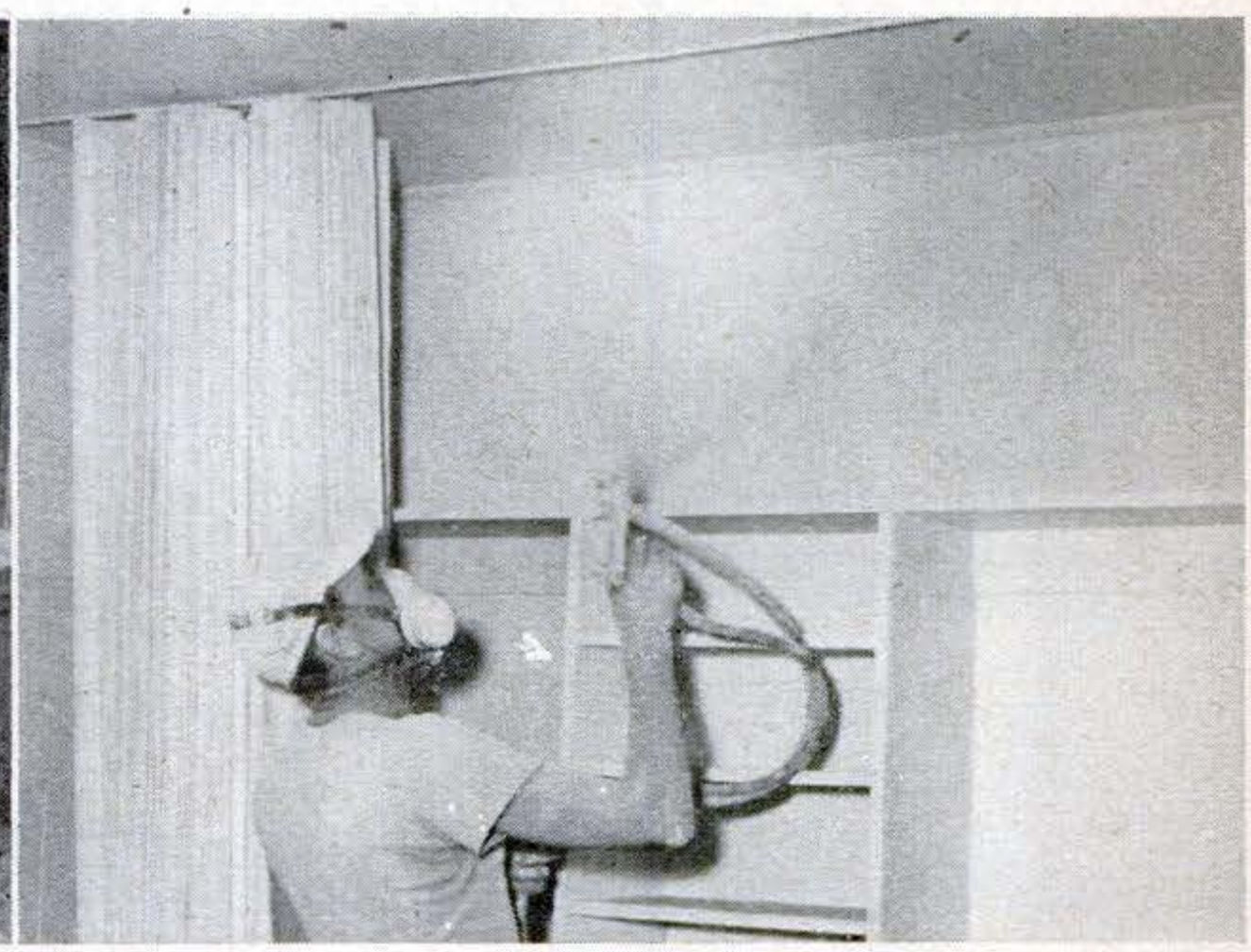
Three-sided fireplace is the core of every dwelling, with the living areas surrounding it.

Pennsylvania's Levittown traces its genealogy back a few years to the fabulously frenzied postwar development in Long Island that unexpectedly mushroomed from 1,000 to over 17,000 units in an unplanned patchwork and left Bill and Alfred Levitt holding the undisputed title of America's biggest and fastest house builders.

Levitt engineers have perfected techniques of assembly-line precision with 4,000 workmen, each of whom does only one thing and has a personal stake in his

[*Continued on page 258*]





SPECKLED PAINT, looking like a pistachio version of chocolate-chip ice cream, was developed to paint Levittown's 100,000 rooms. Entire interior of every house is sprayed with the cream and dark green mixture, called Plextone, which has a washable finish that is harder than gloss enamel and makes the coated wall look like hand-stippled plaster.

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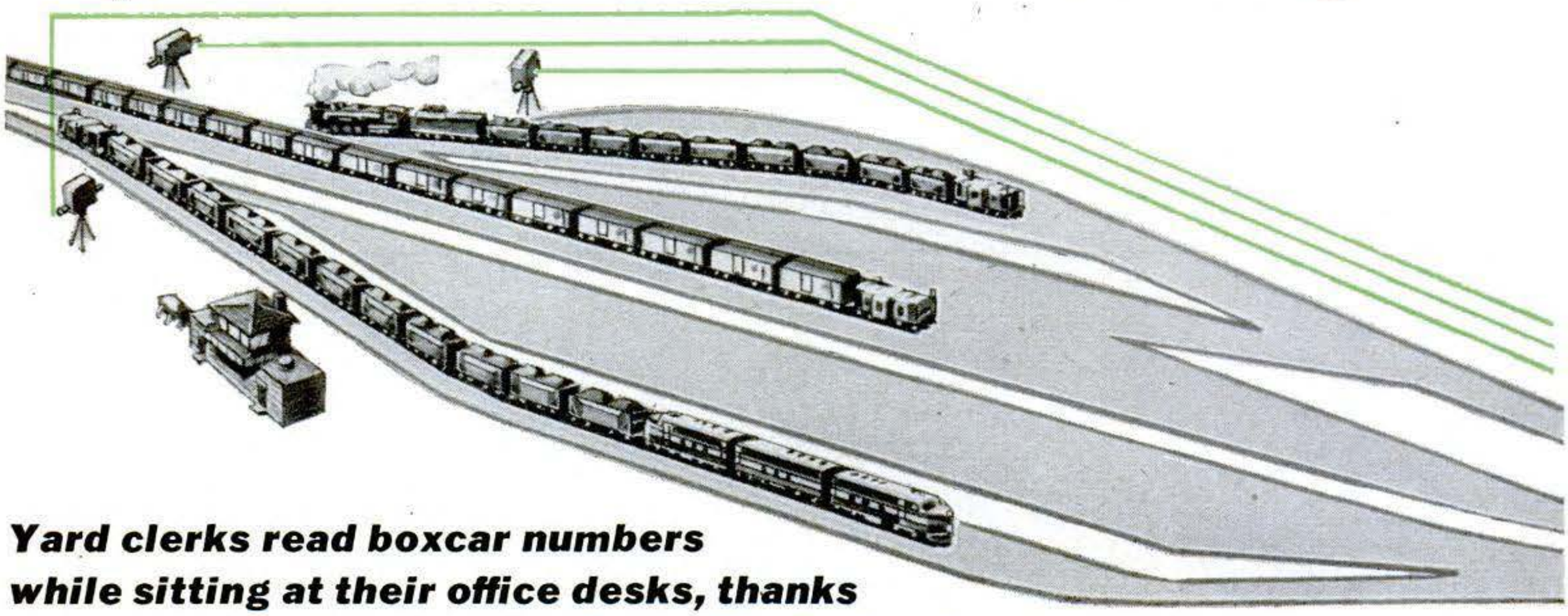
TV Sorts Freight Cars in Chicago



Yard clerks read boxcar numbers while sitting at their office desks, thanks to pint-size video cameras alongside the tracks.

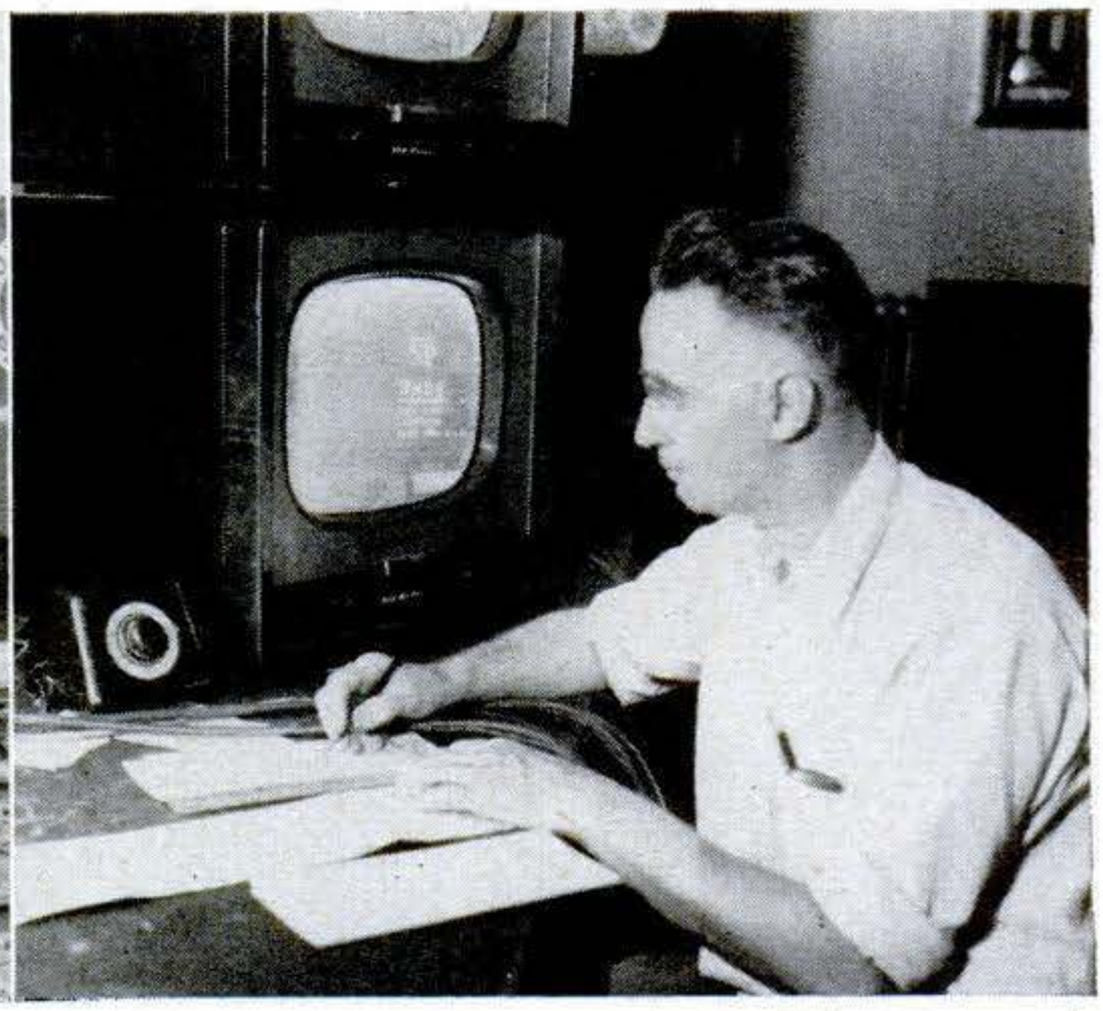
TELEVISION has taken the place of the old "number grabber" in the Baltimore & Ohio's $4,000,000 Barr Yard in Chicago.

No longer do a half-dozen clerks tramp up and down its 50 miles of classification tracks recording freight-car information needed to make up switch lists. Instead, a single clerk in a central yard office twists a couple of dials on any one of four TV monitor sets banked on a table in front of him, watches the cars roll by on their 10-inch picture screens, and prepares his list with speed and comfort.

In spite of its compact and simple design, the new RCA equipment is so sensitive that it will work in any weather by day and under floodlights by night.

Depending upon the success of railroading's first industrial TV experiment, the B&O is ready to extend its use to inspection work on cars and locomotives and to loading operations at big marine terminals.

INDUSTRIAL CAMERA scans a boxcar side as inbound freight rumbles through receiving yard. Standard 16-mm. movie-camera lens picks up name of car owner and number.



YARD CLERK SEES CARS on any of four sets. A touch of a dial changes lens focus by remote control for cars up close or at a distance, so that camera can cover all tracks.

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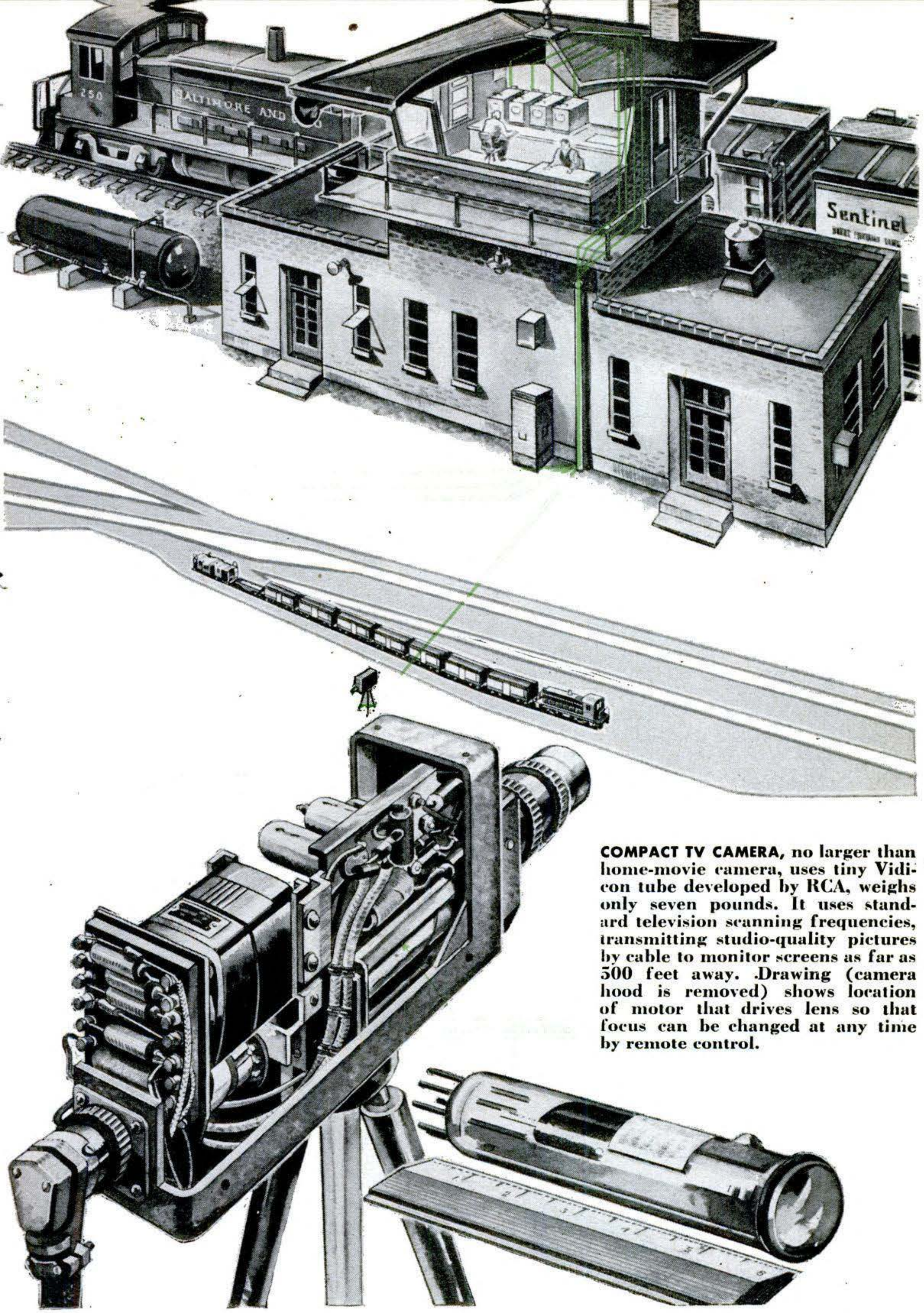

COMPACT TV CAMERA, no larger than home-movie camera, uses tiny Vidicon tube developed by RCA, weighs only seven pounds. It uses standard television scanning frequencies, transmitting studio-quality pictures by cable to monitor screens as far as 500 feet away. Drawing (camera hood is removed) shows location of motor that drives lens so that focus can be changed at any time by remote control.

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HERE ARE THE CHANGES that boost horsepower: 1952 intake manifold (left rear) cut down for '53 (right rear); heat valve (left front) replaced by holes in exhaust manifold.

WILBUR SHAW REPORTS FROM THE DRIVER'S SEAT:

1953 Kaiser "Breathes Deeper"

THOSE ARE NICE LINES, I say. The 1953 Golden Dragon will look like this Manhattan except for goldlike ornaments, fancier interior.

THE biggest news about the 1953 Kaiser is that it has acquired a greater ability to get its breath. Its volumetric efficiency has been improved. This means that the engine can take in more air and fuel more easily and can exhaust the combustion gases better.

To the driver that means extra horsepower and torque from the same six-

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I DIDN'T PUSH THIS OUT, for it takes the sudden heavy impact of one's whole body to pop out a Kaiser windshield. The fact that it *will* give, however, makes the car safer than most.

Engineers took some kinks out of the exhaust system— and came up with more power out of the same engine.

cylinder, 115-horsepower engine that Kaiser cars have had since 1951. The specific gain is as much as 5½ horsepower (though Kaiser conservatively rates it officially as three) and 10 pound-feet of torque. In other words: faster getaway, more efficient cruising, higher top speed.

Back Pressure Steals Power

Kaiser engineers have been working toward this goal for two years. They finally reached it by means of an ingenious change in the design of the intake and exhaust manifolds. They also altered the carburetor slightly and enlarged the tailpipe and muffler tubes a bit. These changes—the secret of added power—greatly reduced exhaust back pressure.

Back pressure is created because exhaust can't travel a straight road out of anybody's automobile engine. Whenever exhaust takes a curve, it slows up.

Exhaust begins to back up on its way from the cylinders to the exhaust manifold. It backs up still more in the maze of tubes and baffles inside the muffler.

As exhaust piles up, the engine has to use some power to get rid of the gas. In an engine the size of the Kaiser's, an increase of one pound in back pressure causes a loss of about two horsepower.

To understand how Kaiser engineers managed to get rid of enough back pressure to gain 5½ horsepower, you need to know what they had to start with.

The Kaiser engine gets heat for its in-

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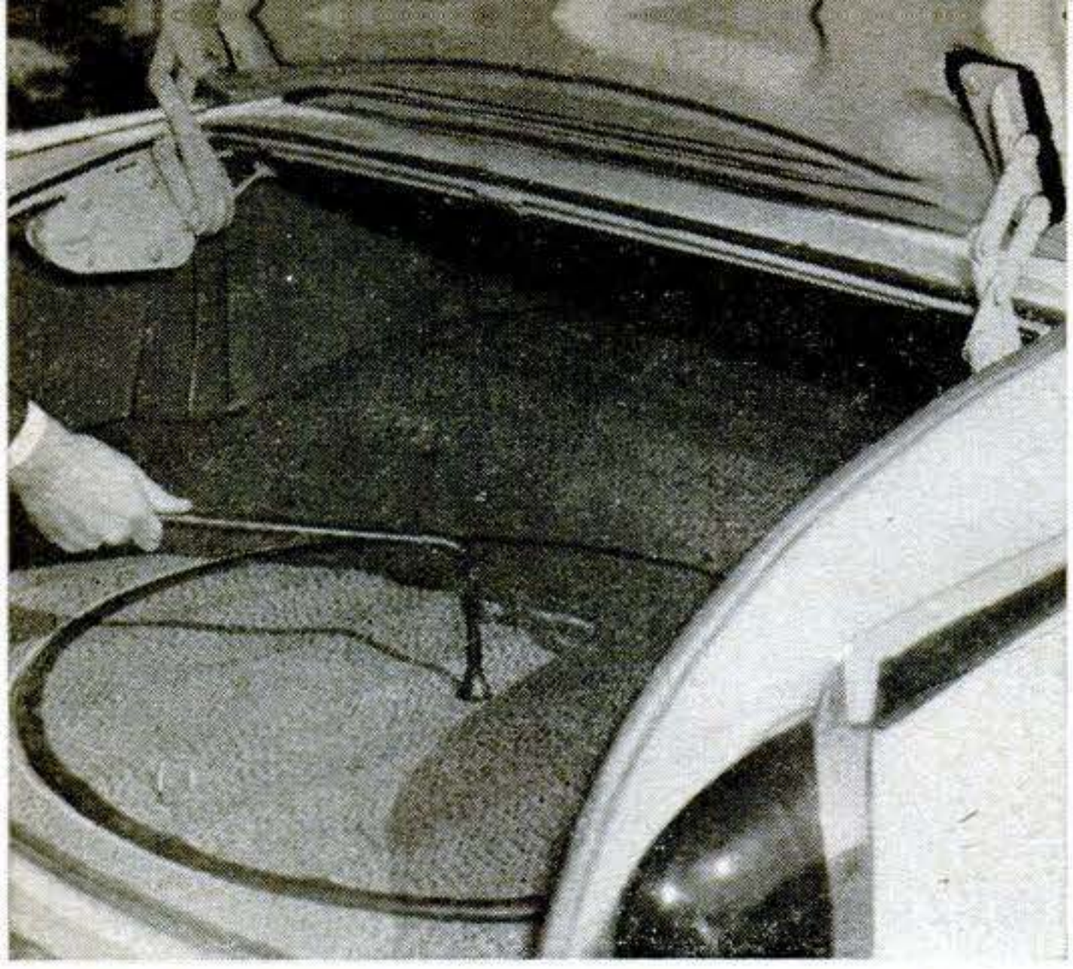

THREE CHANGES in the rear deck include lights that go on as the lid rises, counterbalanced hinges for the lid, and a lock nut to hold the spare tire firmly in its floor well.

NICE LINES HERE, TOO, I think you'll agree. The improved crash pad topping the dash, created to protect children, will be copied in the 1953 Henry J, a longer car than before.

take manifold—essential for engine warm-up—from the exhaust of cylinders 3 and 4. In the 1951-52 engine, the exhaust from both cylinders entered a single large passage. In the passage was a heat valve, controlled by a thermostat. When the engine was cold, the heat valve was wide open, so that it shot exhaust up against the floor of the intake manifold, under the carburetor. As the engine warmed up, the thermostat closed the heat valve, shunting the exhaust out the muffler.

Lots of cars use this arrangement, but because a heat valve sometimes flutters noisily, occasionally corrodes and fails, and is never 100-percent efficient, Kaiser engineers wanted to get rid of it.

First, they enlarged and straightened the exhaust tubes from cylinders 3 and 4, which used to make two right-angle bends on their way to the heat valve. Taking out the bends, which obstructed the passage of exhaust, eliminated a principal source of back pressure.

The Heat Valve Goes

Then, in place of the heat valve, they placed a wall of metal across both tubes and drilled a couple of holes in it, one at the end of each tube. It took a lot of experiment to find out how big those holes should be, but the size finally arrived at makes possible a very effective "pulse" exhaust action.

As the cylinders fire in turn, exhaust

[Continued on page 264]

FACTS ON '53 KAISER

Model: Manhattan four-door sedan.

Engine: 6-cyl. L-head; 118 hp. at 3,650 r.p.m.; compression ratio, 7.3:1; piston displacement, 226.2 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,915; bore and stroke, 3 5/16" by 4⅜"; crankshaft bearing surface, 44.6 sq. in.; torque, 200 lb.-ft. at 1,800 r.p.m.

Weight: 3,220 lb.; per hp., 28 lb.

Transmission: Dual-Range Hydra-Matic; rear-axle ratio, 3.31:1.

Steering ratio: 18.2:1; radius of turning circle, 19 ft.

Effective brake-lining area: 175.7 sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height, 60"; overall length with bumpers and guards, 212"; width, 74"; wheelbase, 118½"; overhang, front 38.75", rear 54.75"; tread, front 58", rear 58.75".

Inside dimensions: seat-cushion width, front 64", rear 63"; leg room, front 43", rear 40"; headroom, front 37.25", rear 36"; seat height, front 10.75", rear 12.75"; vertical distance, steering wheel to seat cushion, with seat in mid-position, 6"; front-seat adjustment, horizontal 7", vertical .31".

Tire size: 6.70 by 15.

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WILBUR SHAW REPORTS FROM THE DRIVER'S SEAT:

New Dodge V-8 Uses Same Oil 6 Months

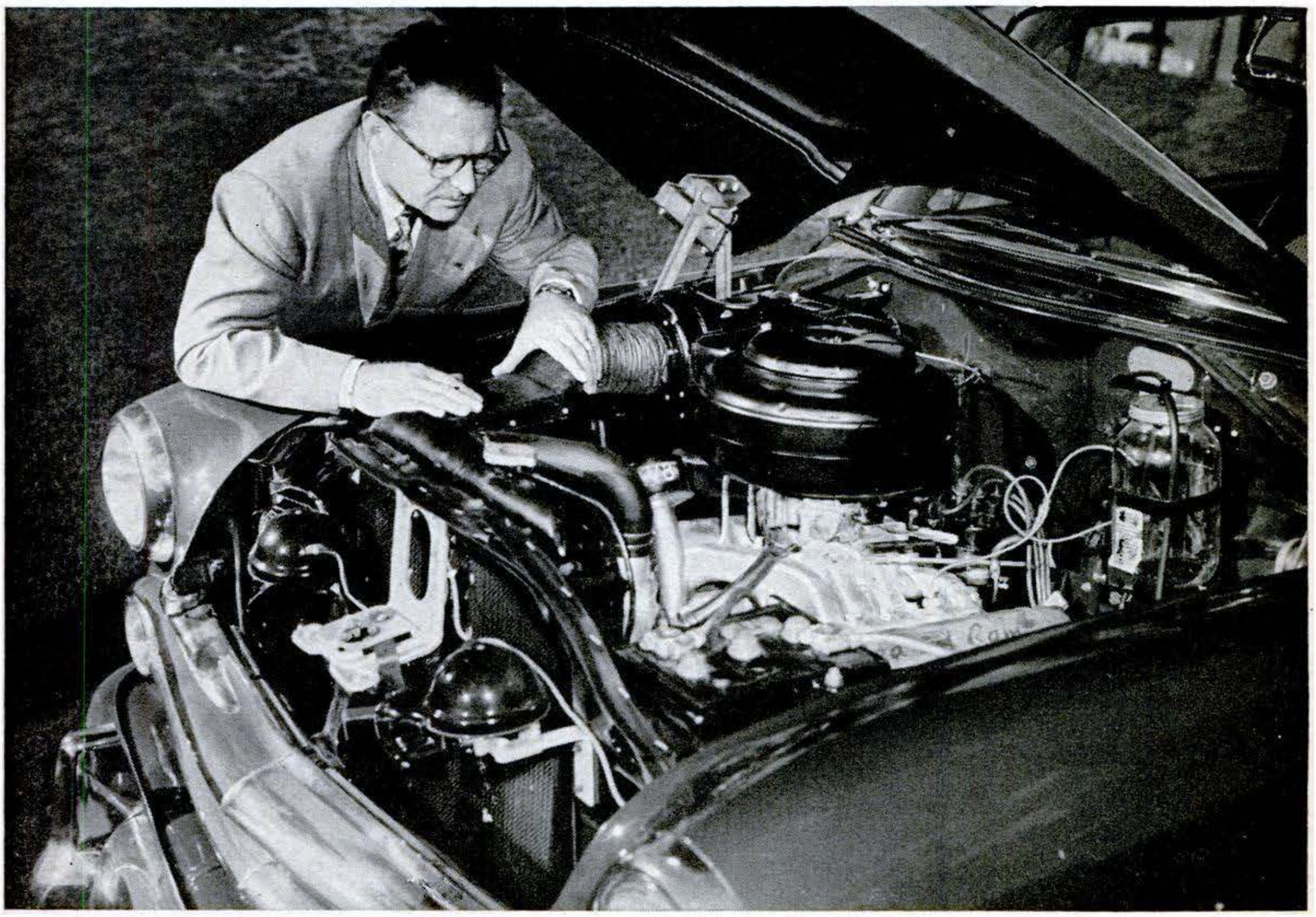
The transmission—a fast-getaway torque converter—shares the engine's oil supply and helps keep it cool.

AT A street intersection in my home town of Indianapolis the other day, I heard an exhaust that sent my mind racing back 30 years. It was the slow, measured put-put-put-put of a four-cylinder engine. I knew without looking what it was: an old Dodge with its engine idling.

Nothing before or since has ever sounded like that rugged old Dodge.

A memory of that car, as well as of the Dodge I owned and loved, stayed with me when, a few days later, I slid behind the wheel of a spanking-new Dodge V-8, the model announced this fall.

Times change. The sound from the ex-



THAT SQUATTY CARBURETOR I'm looking at under the big air cleaner keeps hood low. Not water-jacketed, it has thin aluminum walls to absorb engine heat and prevent icing.

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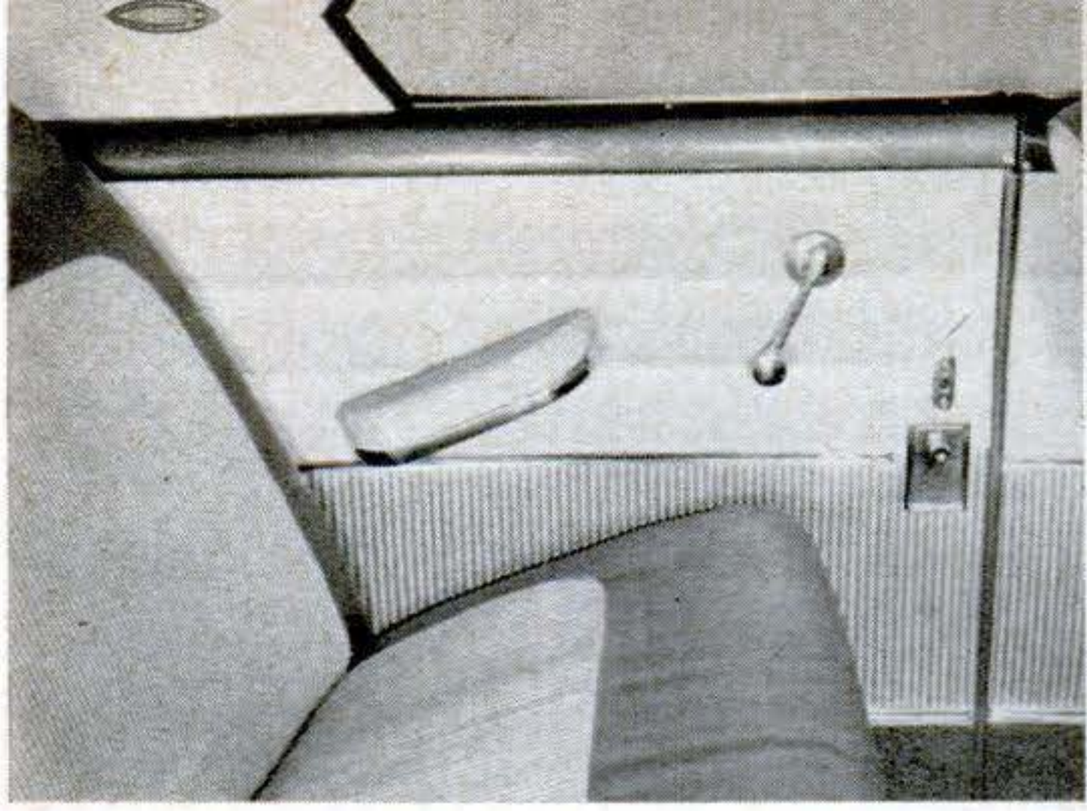
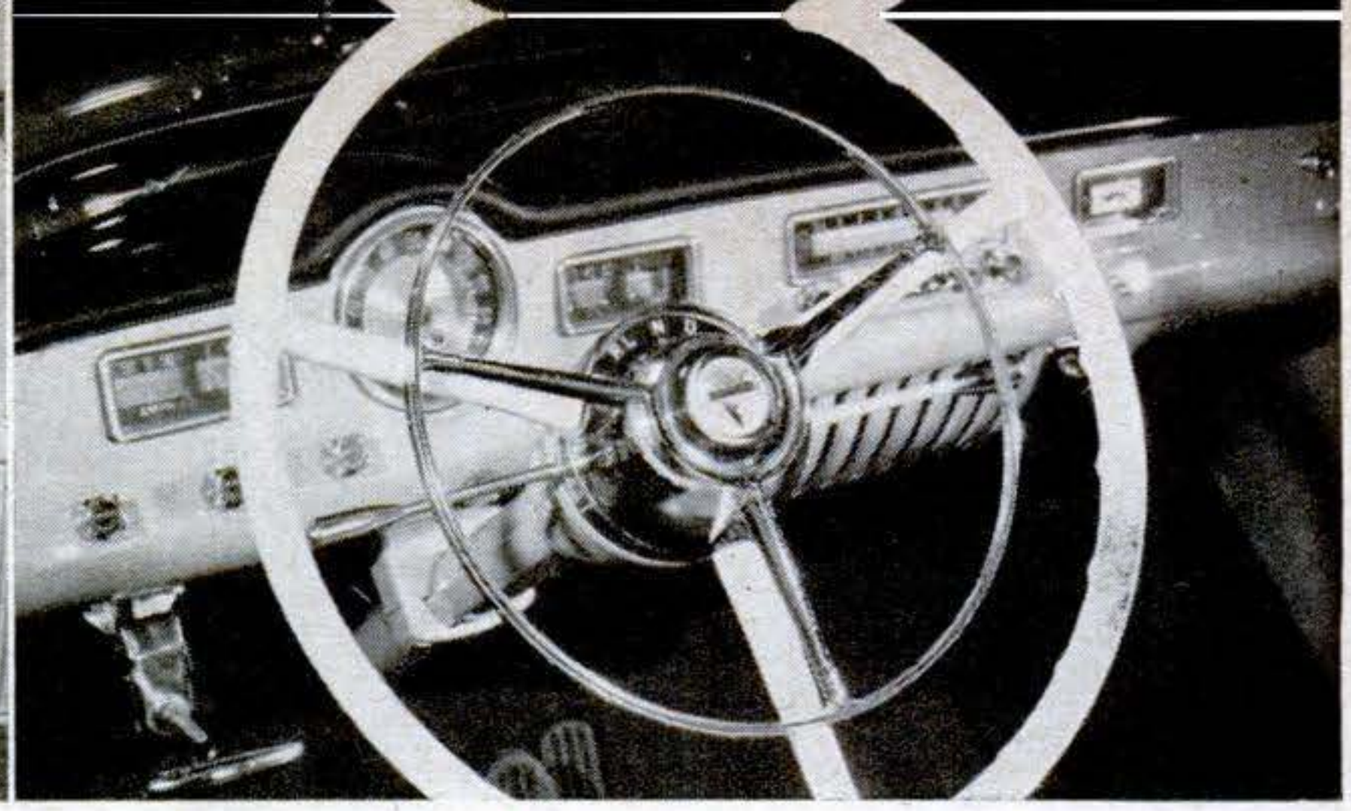


THE TILTED ARMREST is the result of a lot of people saying, "I want it at about this angle." The upholstery is a nylon-rayon synthetic that clothes slide over easily.



INSTRUMENTS ARE MOUNTED in a recessed strip. Speedometer has "eyebrow" to cut reflections at night. One-piece windshield has same curvature throughout to prevent distortion.

haust of the 1953 Dodge has a good deal more cadence. It's lower, a barely discernible mutter. Instead of 30 horsepower, I had 140. Instead of gears that clanked in meshing, I had a smooth-working transmission with a torque converter. Instead of a top speed of 60 (reached only after five miles of urging, I had a car that would top 100.

But the new Dodge and the old one have one thing in common. That's sturdiness. The company builds 'em that way.

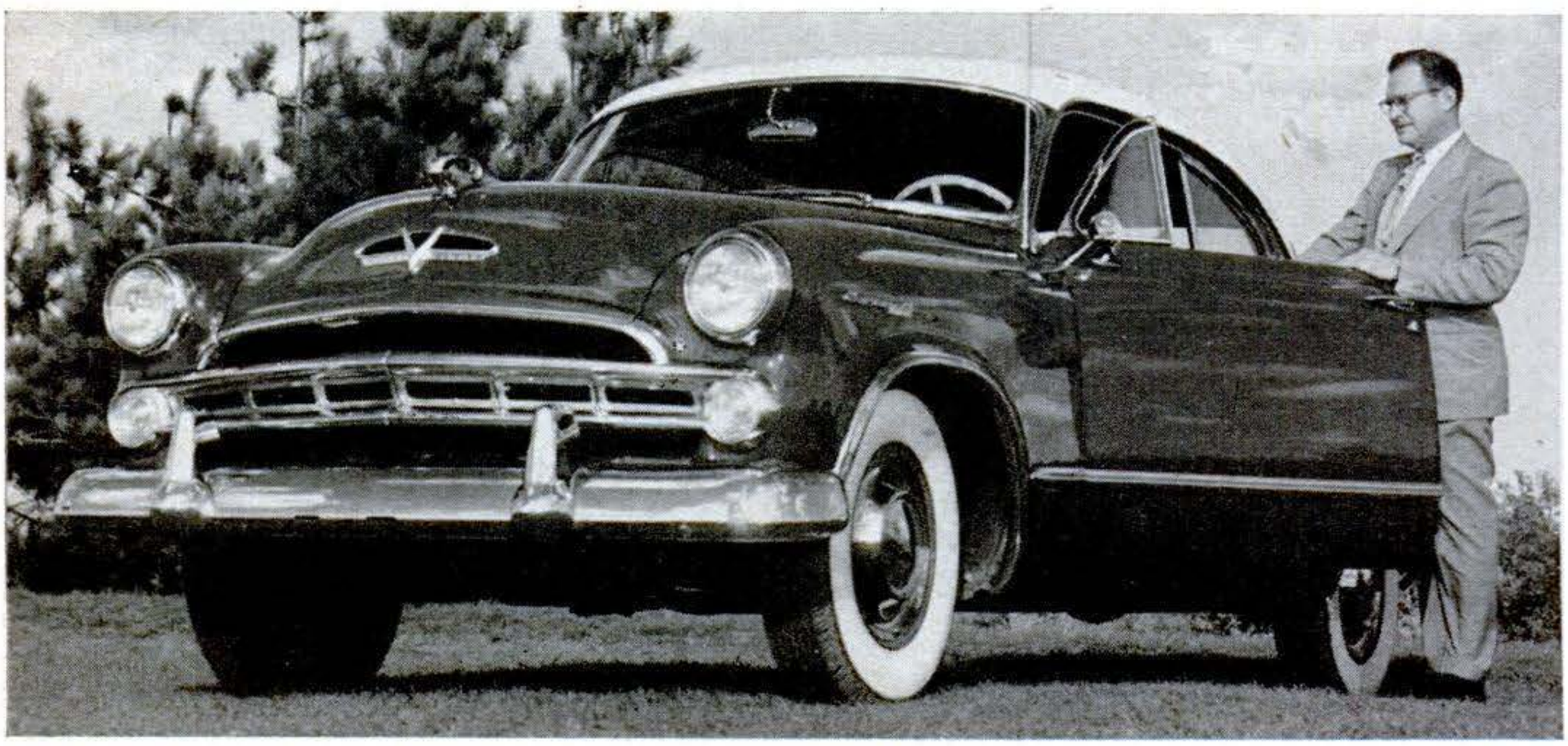
The old Dodge wasn't the flashiest performer on the road. Nor will the new one be. While I was in Detroit I saw a confidential memorandum on this car. It said that Dodge's pickup from a standing start would "almost equal" that of a competitive car. And, it added, at certain speeds it would out-accelerate the other.

Not for Racing

It is typical of the company to refuse to be swept away by the current race to get out in front when the light turns green. Even so, this Dodge is more powerful than the biggest Chrysler was just three years ago. It has splendid acceleration. Here's the record:

Zero to 20 miles an hour in 2.90 seconds.
Zero to 40 in 8.32 seconds.
Zero to 60 in 16.4 seconds.
Zero to 80 in 32.4 seconds.
And 60 to 80 in 16 seconds.

I don't know of a sensible motorist



THE 1953 DODGE has a familiar look—they've kept the design of the grille. Otherwise, it's practically all new. The opening in the hood is no phony, sending air to the carburetor.

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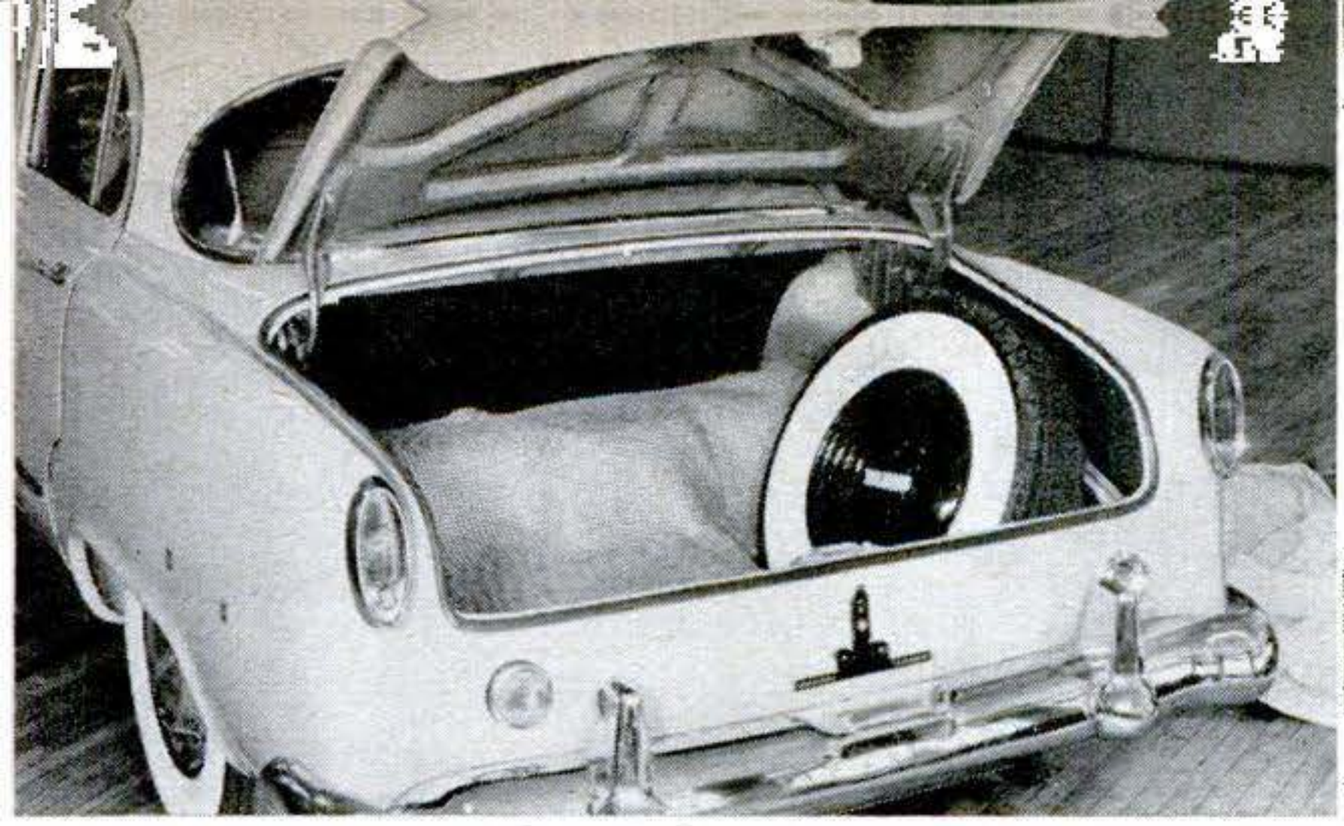
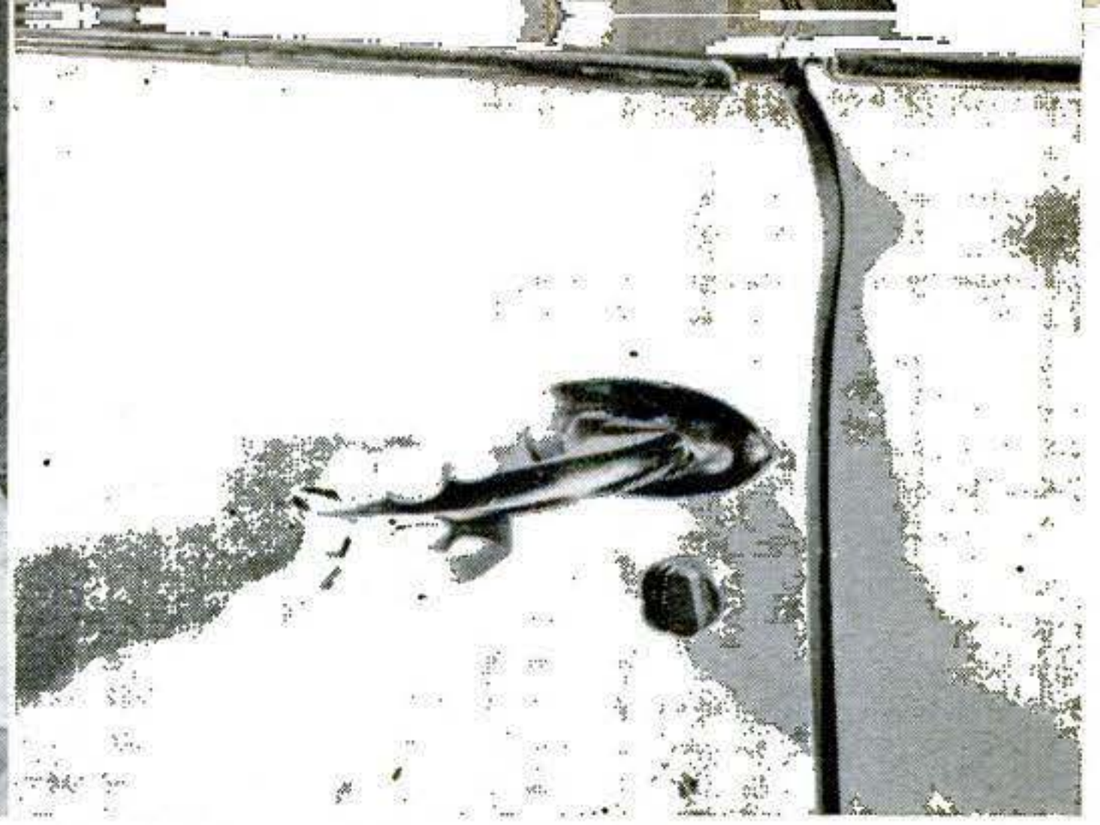
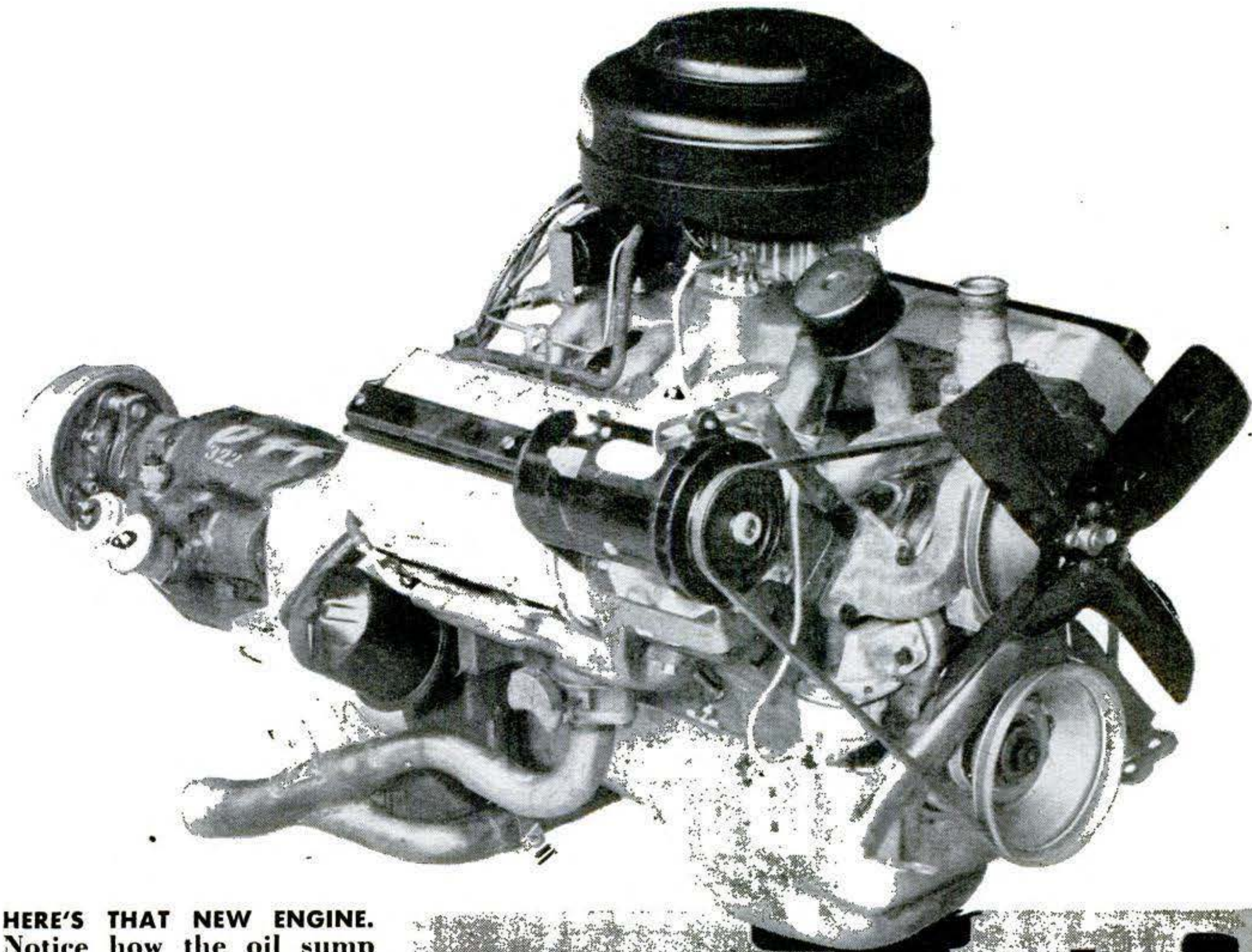


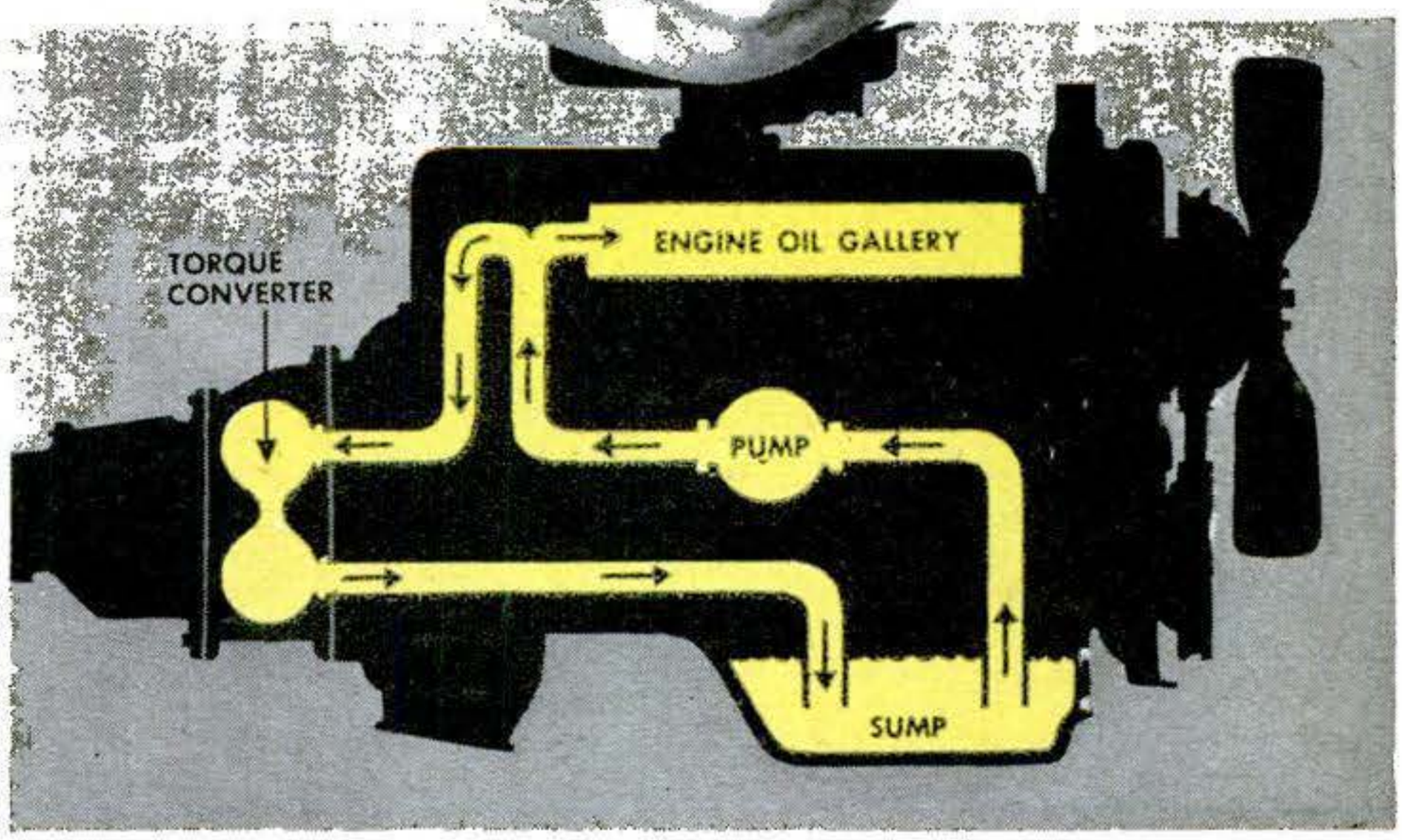
THE TRUNK has half again as much space as old one. Twin spots below sill are gas cap (left) and backup light. Combining rear quarter panel with fender makes repair costly.



THE PULL-DOWN DOOR HANDLES are gone. Now they pull out. On the sedans, body center posts have been camouflaged with door flanges. Note absence of beltline molding.



HERE'S THAT NEW ENGINE. Notice how the oil sump has been put up front. That's to accommodate the exhaust collector pipe running underneath from the opposite cylinders. In the diagram at right, you can see how the oil circulates from the sump to the torque converter and back again so both engine and converter use same supply.



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who would ask any more from a car. A city street is not a race track, pardner.

This performance results mostly from the new engine, the first V-8 in Dodge history. The new power plant, which runs on ordinary nonpremium gas, is a descendant of the 1951 Chrysler V-8 with the hemispherical combustion chambers (PSM, Mar. '51, p. 134). The design was passed on down to DeSoto in 1952 (PSM, Dec. '51, p. 169).

Dodge's Most Efficient in U.S.

Now Dodge has got it. They've improved on it. It's smaller than Chrysler's or DeSoto's. But it may well be the most efficient passenger-car engine in the U. S. At this writing, with the bulk of the 1953 cars still to be announced, the Dodge V-8, the company says, produces more horsepower per cubic inch of piston displacement than any other, regardless of design.

Named the Red Ram, this engine has less than 1/20 more displacement than the old six. Yet it produces 35 percent more power.

Behind the engine is a new torque converter. This is another first in Dodge history. Previously the Dodge had a simple fluid coupling—which does *not* multiply torque—backed up by a semiautomatic gearbox.

But now its torque converter multiplies the twist of the engine crankshaft 2½ times when you step on the accelerator from a dead start. That's the highest figure, according to the company, for converters in the passenger-car industry.

With the selector lever in the drive range, a mechanical transmission behind the converter multiplies the engine torque 1.63 times. And that, of course, accounts for the acceleration despite a rear-axle ratio of only 3.54 to 1.

Now get ready for a shock. How often do you change your engine oil—every thousand miles, or two thousand, or three? Dodge is advising the buyers of cars equipped with its torque converter that for ordinary driving, up to 12,000 miles a year, they don't have to change oil more than twice a year, in the spring and in the fall.

Oil Does Two Jobs at Once

That's due to a new gimmick. The hydraulic fluid in the torque converter, separately sealed off in other company's cars, comes right from the engine oil sump in the Dodge. Engine and converter have a common oil supply. A check valve maintains a proper oil supply in the converter and drains out any surplus.

Dodge was anxious to add a torque converter, but no complicated plumbing. In other torque converters, the hyrdaulic fluid was piped to a heat exchanger be-

[*Continued on page 286*]

FACTS ON '53 DODGE

Model: Coronet Series "Diplomat" hardtop convertible.

Engine: 8-cyl. inclined lateral valve-in-head; 140 hp. at 4,400 r.p.m.; compression ratio, 7.1:1; piston displacement, 241.4 cu. in.; piston travel (in feet per car mile at 20 m.p.h.), 1,408; bore and stroke, 3 7/16" by 3¼"; crankshaft bearing surface, 11.34 sq. in.; torque, 220 lb.-ft. at 2,000 r.p.m.

Weight: 3,530 lb.; per hp., 25.2 lb.

Transmission: torque converter (optional) and sliding-type reduction gears; rear-axle ratio, 3.54:1.

Steering ratio: 18.2:1; radius of turning circle, 19'10".

Effective brake-lining area: 173½ sq. in.

Springs: front, coil; rear, semi-elliptic.

Outside dimensions: height (loaded), 62"; over-all length with bumpers and guards, 201⅜"; width, 72¾"; wheelbase, 119"; overhang, front 34⅝", rear 47¾"; tread, front 55 15/16", rear 58¾".

Inside dimensions: seat-cushion width, front 60", rear 60½"; leg room, front 43⅛", rear 39"; headroom, front, 36¼", rear 36"; seat height, front 14¾", rear 14¼"; vertical distance, steering wheel to seat cushion with seat in mid-position, 5¾"; front-seat adjustment, horizontal 5", vertical 1⅛".

Tire size: 7.10 by 15.

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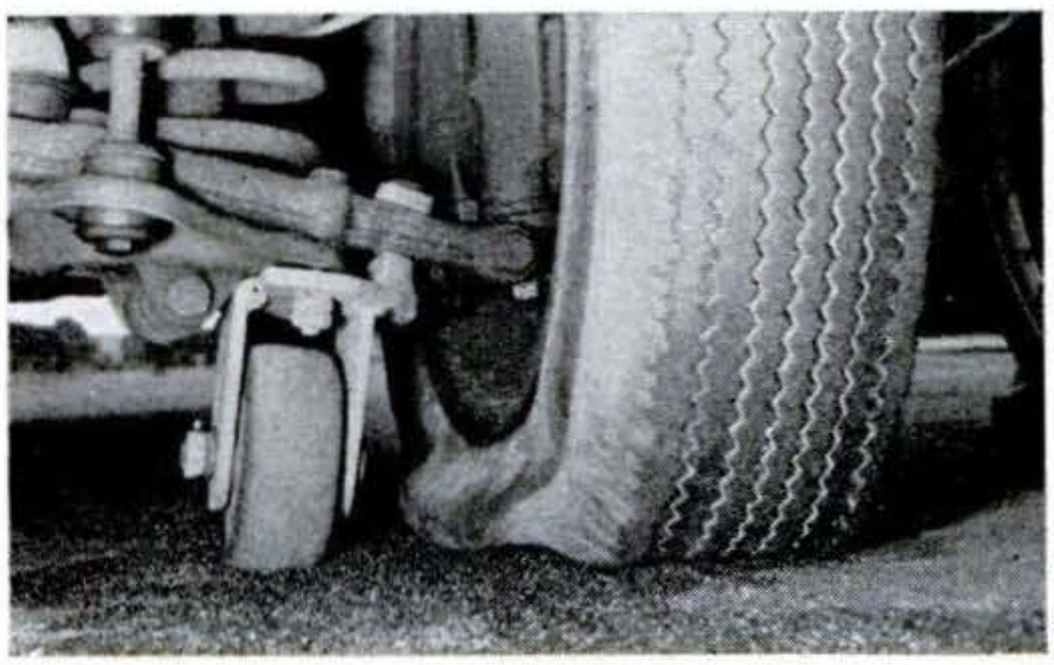
Chryslers for 1953 Are Lower, Stronger and Shorter

THE new Chrysler cars, announced last month, have entirely new frames to increase their rigidity. They also—take a close look—are an inch lower without a sacrifice of headroom.

The New Yorker de luxe club coupe (above) is restyled, as are all the other models. The rear fenders are integral with the body sheet metal. The one-piece windshield is curved and the grille has been redesigned. Chrysler retains its 180-hp. V-8 engine. Wheelbase is 125½ inches.

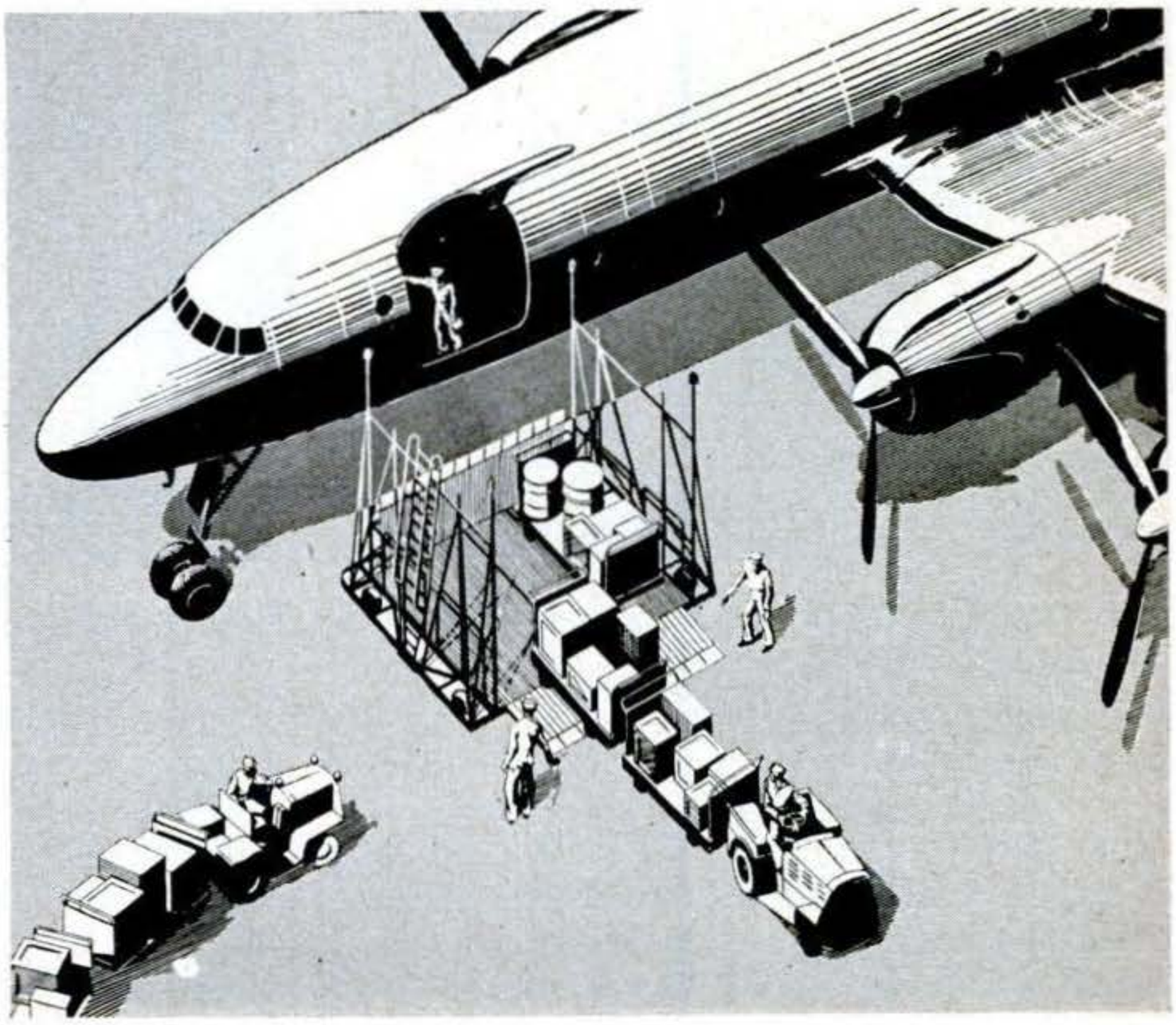


Caster Serves as Tire Crutch

THE German inventor of the automobile caster shown at left is never too let down if he gets a puncture on the road. The tiny extra wheel with its solid rubber tire takes over the load. It keeps the car from riding on the wheel rim while the driver limps along to the nearest garage for repairs. Casters are bolted at each end of the front axle on the lower wishbone of the knee-action assembly.

Powered Lift Platform Speeds Cargo Loading of Transport Planes

THREE automobiles at a time can be loaded aboard a big air transport when this cargo lift is towed alongside. The elevator is powered by electricity from the plane itself or from a local source. Cables running up the corner columns do the lifting. The Aerolift, at present being used to speed the handling of heavy freight for the armed forces, can be knocked down and carried in the plane. Designed by Lockheed, the rig also can be used for loading litter patients and as a work platform for engine maintenance.



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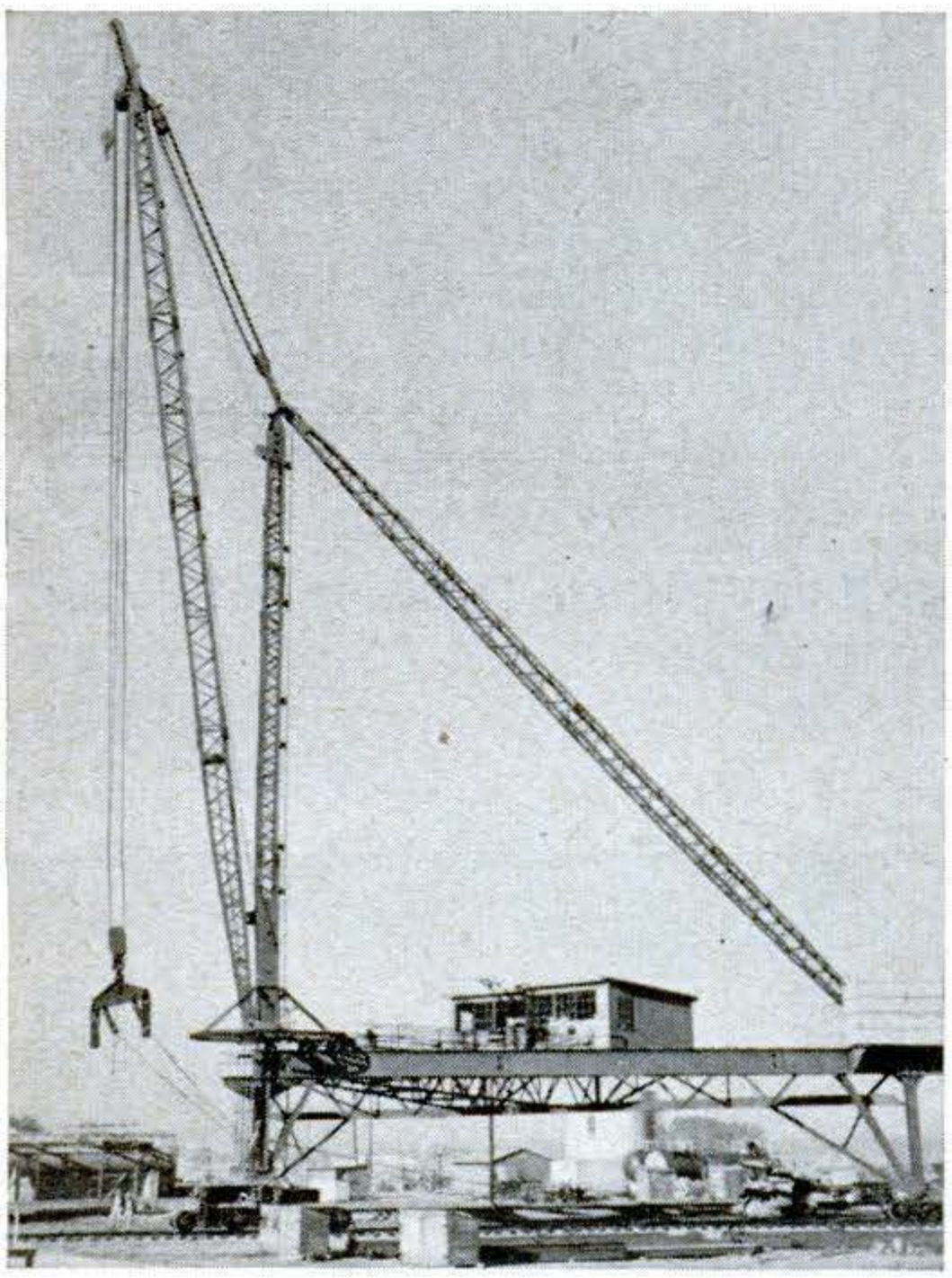
One-Man Rotary Plow Lightens Winter Work

THE aching back is taken out of the chore of clearing paths in snow by a new easy-to-push power plow that rides on three wheels. The plow's rotor, chain-driven by a 2½-horsepower, four-cycle engine, can chew a path 17 inches wide in snow two feet deep. It shoots the snow 10 to 15 feet to the right or left through a shiftable, spring-loaded chute. A heating device prevents the carburetor and governor from freezing. The plow, made by the Toro Manufacturing Co. of Minneapolis, can be adjusted so that it will scrape a sidewalk or clear the ground by as much as an inch and a quarter.



Atomic Plant Gets a Big Lift

HOURS of work and thousands of dollars have been saved during the building of large towers at the new Savannah River atomic-energy plant in Georgia by this gigantic derrick. Shown above in the act of lifting 186 tons, the derrick is 87½ feet long. It is a Special 200-ton Stiffleg with a boom that rises 150 feet above the ground.

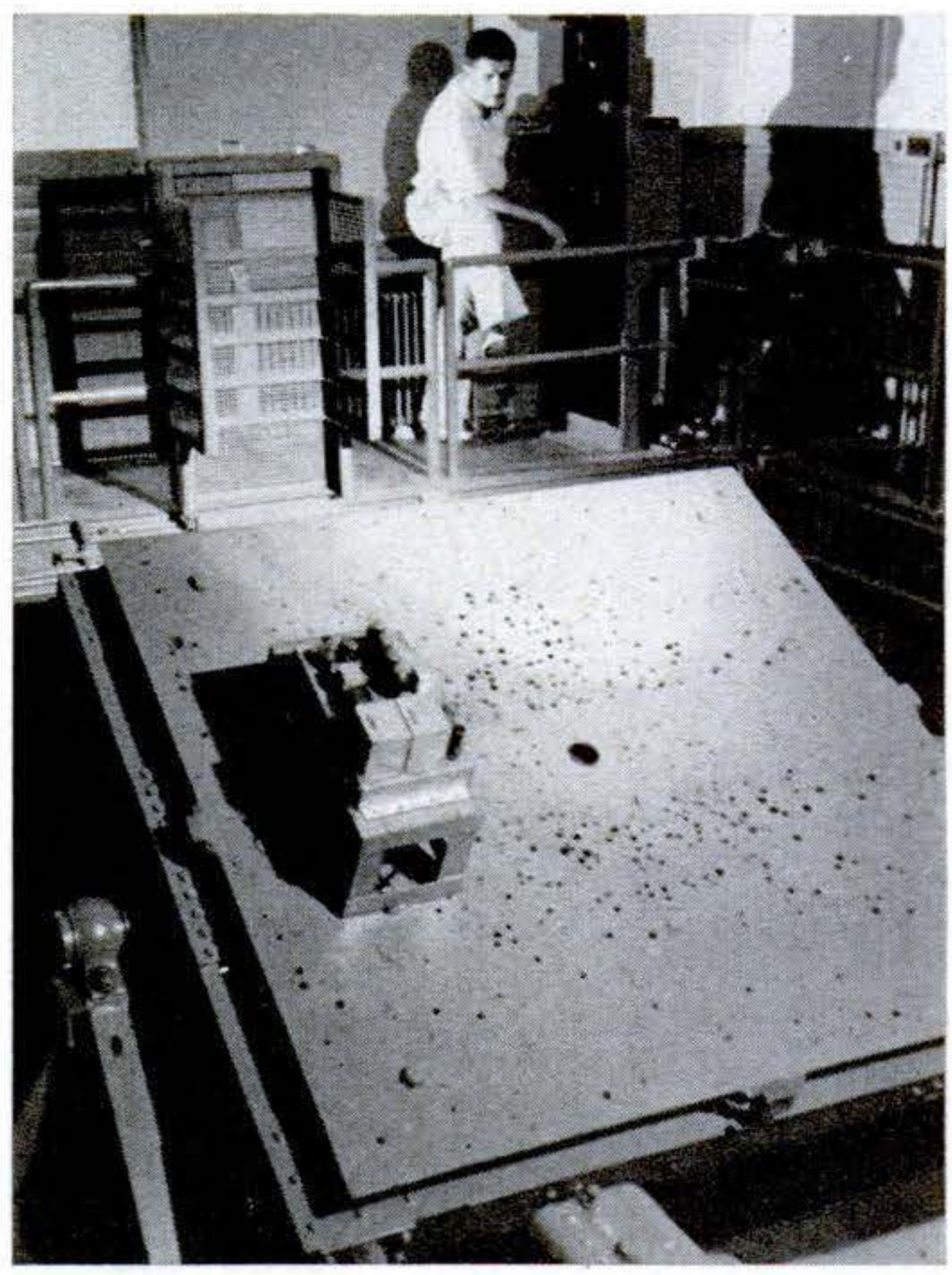


Table Kicks Up a Storm

THE impact of a huge wave on the bow of a naval vessel or the shock it takes when its big guns are fired can be duplicated on this pockmarked table in the Bell Telephone Laboratories at Whippany, N. J. The table, which can roll up to nine times a minute with a ton of seagoing gear on it, was built to test electronic equipment.

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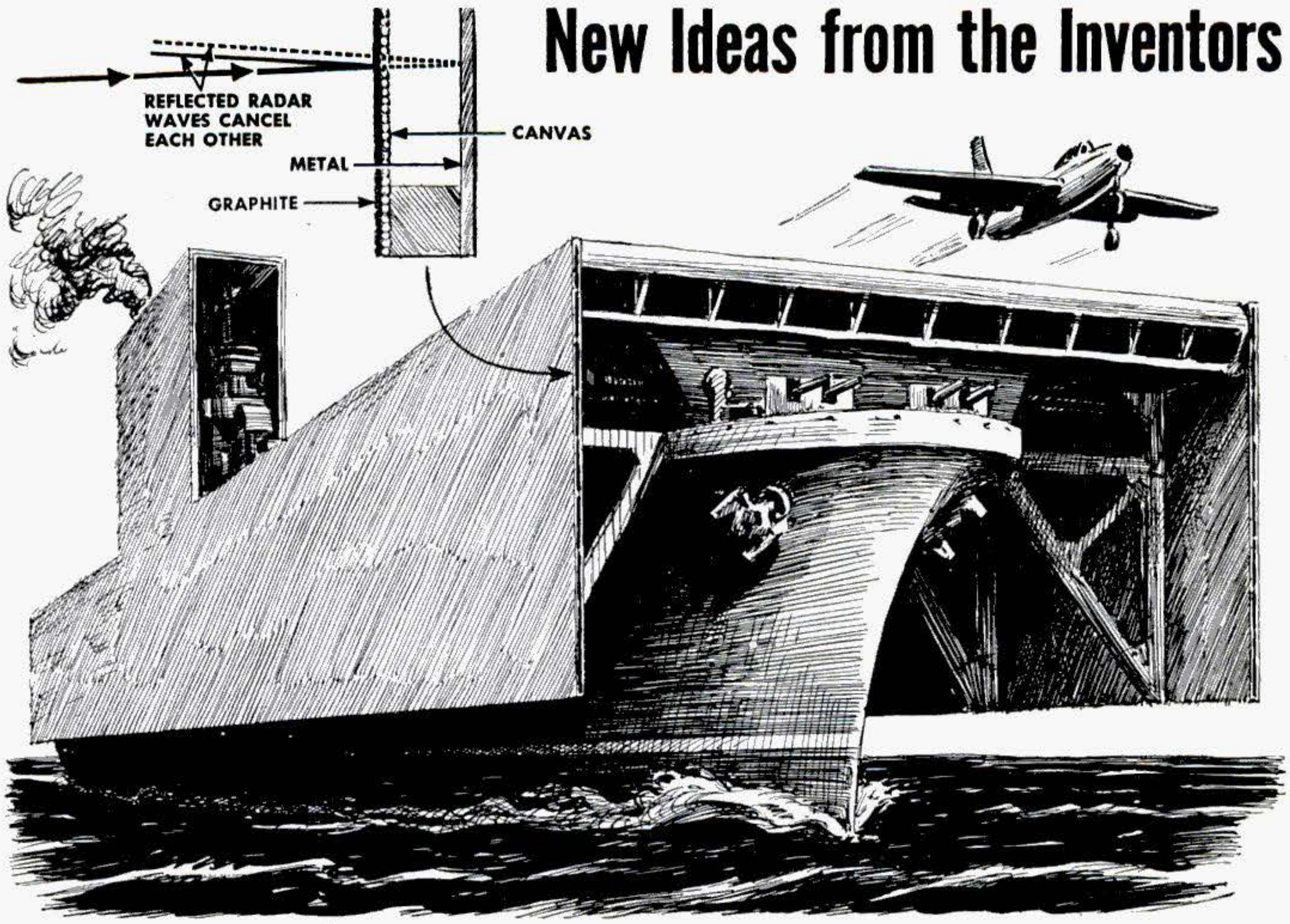
New Ideas from the Inventors



1 Shield to Radar-Proof Ships. The U. S. Navy has a way to make warships invisible to radar. It's a patented sheathing with a graphite-coated canvas facing, and metal backing. Both reflect radar waves, but out of phase, so each reflection would kill the other. Despite limitations—only certain radar wave lengths are stopped, according to facing-to-backing distance—tactical war uses are easily imaginable.

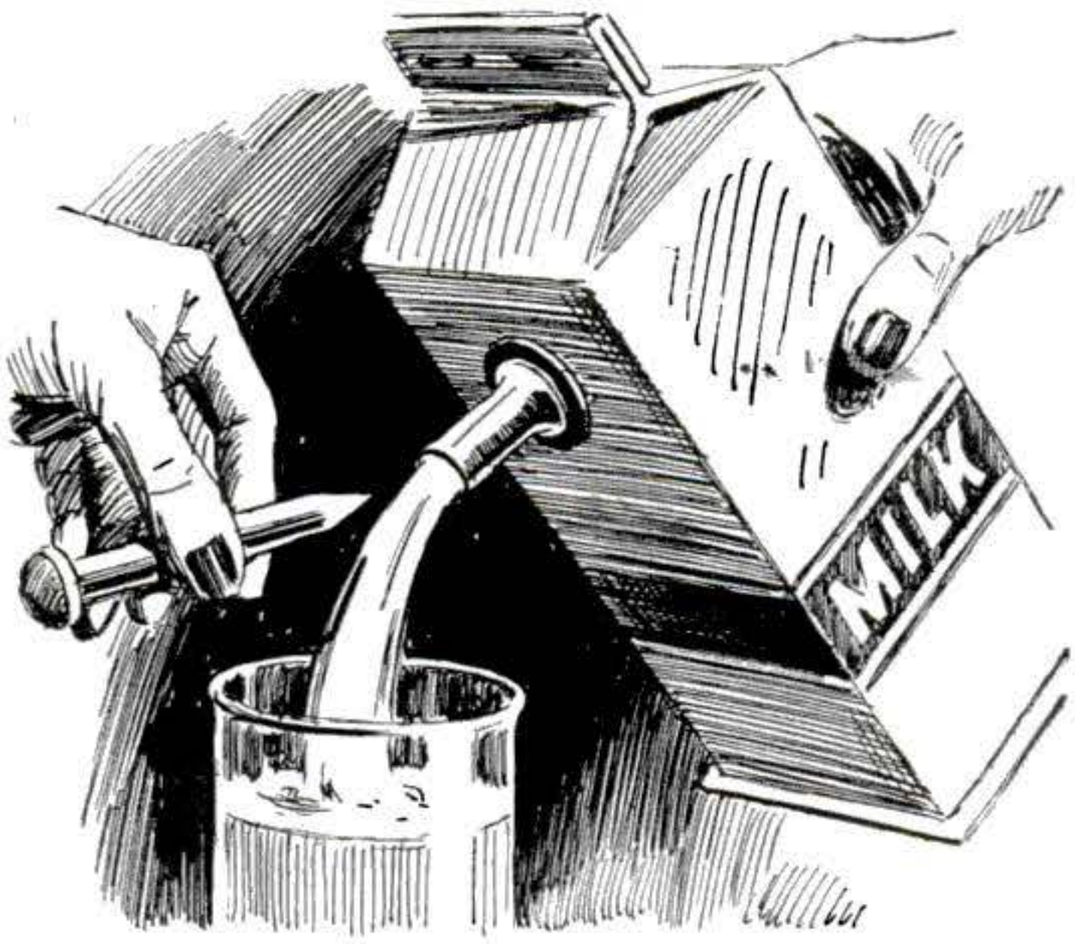
2 Bumper Guard to Stop Car. Mounted behind a car's rear bumper, this pressure-sensitive "feeler bar" would protect a motorist from backing into a hydrant, tree or other obstruction. When the bar moved, a quick-acting trigger would automatically slam on the brakes in time to avert serious damage.

3 Flashlight to Be Disposable. Suited to cheap mass production, this design joins cells, bulb and switch in one piece. When the battery ran down, you would just throw away the whole works and get another. There's no expensive case to be corroded and ruined if you forgot to remove worn-out cells.

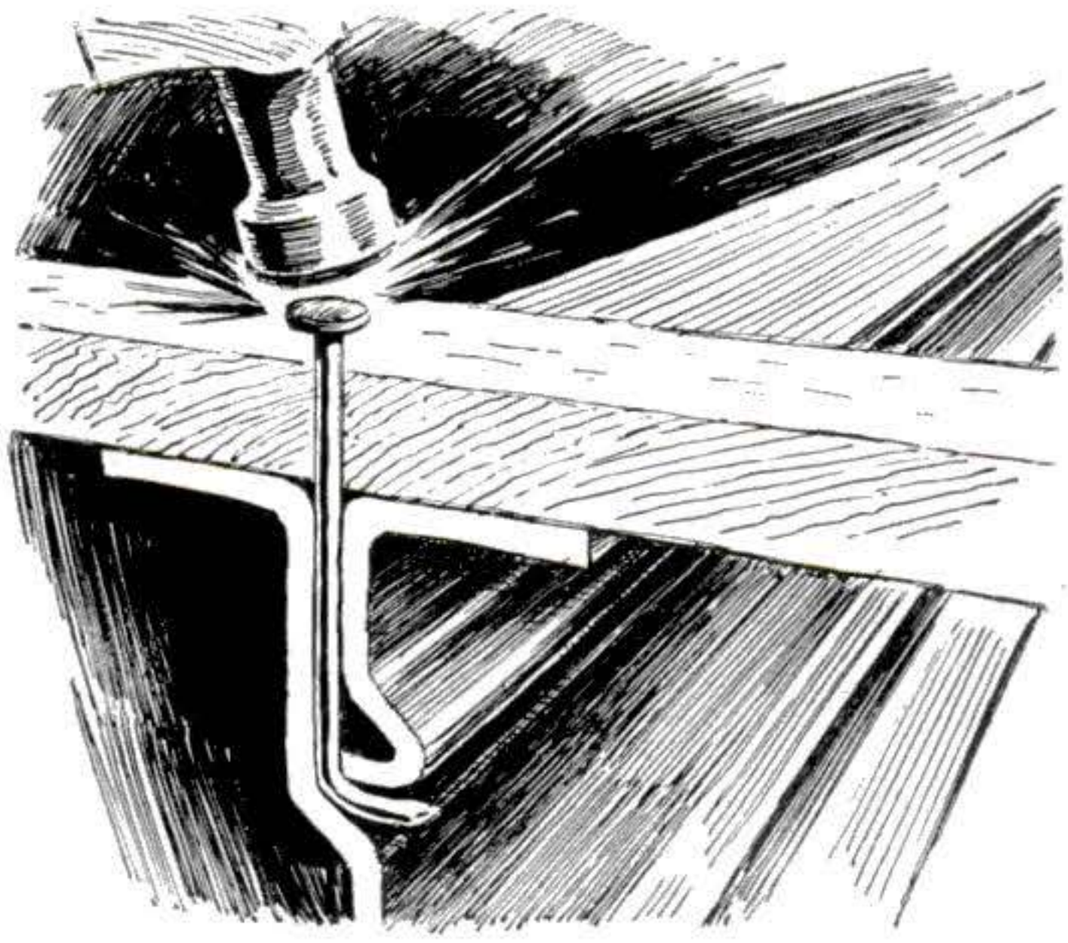
Please turn the page for more new ideas.

MORE New Ideas from the Inventors

4 Sled to Have Treads. Junior could go coasting on a snow-covered hill in winter or a grassy one in summer with this sled, the inventor maintains. For runners, it would substitute resilient endless treads passing over rollers along the bottom and at front and rear. Handle bars operated by hand or foot would apply brake shoes to either tread to steer the sled and to both treads to slow or stop it.



5 Spout to Pour Milk. Thrust through the side of a paper milk carton, the accessory above is intended to form a handy spout for pouring. The spike would help pierce the carton, then become a removable plug to open and close it. A resilient ring on the spout would prevent leaks.



6 Nails to Lock in Steel Beam. A nail driven into the slot in this metal beam would be bent to a hook shape to lock it in tight. The beam design includes a shoulder to curve the nail as it enters. In this way wood, wallboard and other building materials could be fastened quickly and securely.

Patents on these inventions have been granted to: 1. Winfield W. Salisbury, Arlington, Mass.; 2. Peter A. Fasolino, Buffalo, N. Y.; 3. Ferdinand H. Müller, Roseland, N. J.; 4. Cletus L. Jasper, Knoxville, Tenn.; 5. Frank D. Sherwood, Fresno, Calif.; 6. Brinkley B. Brown, Houston.

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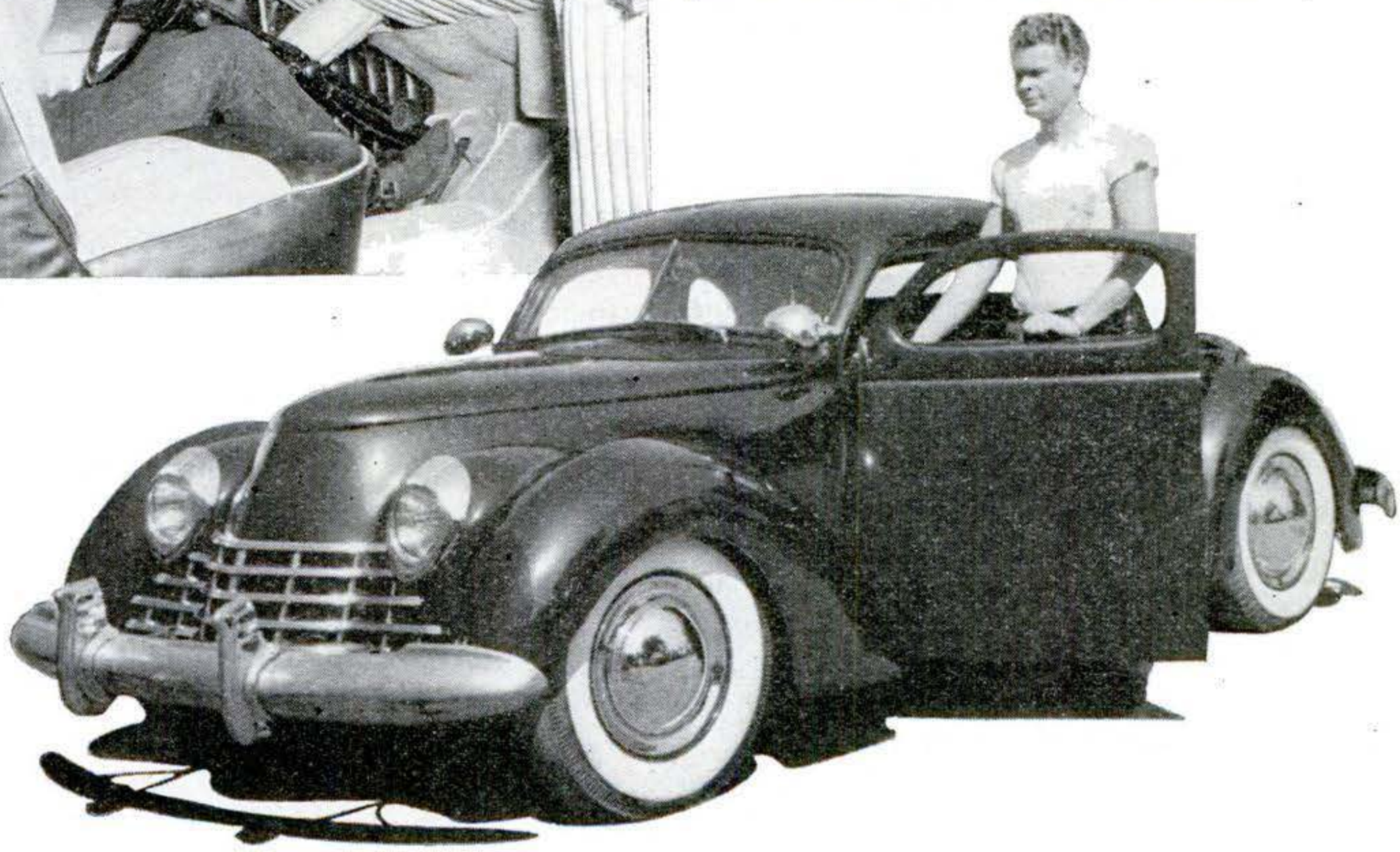
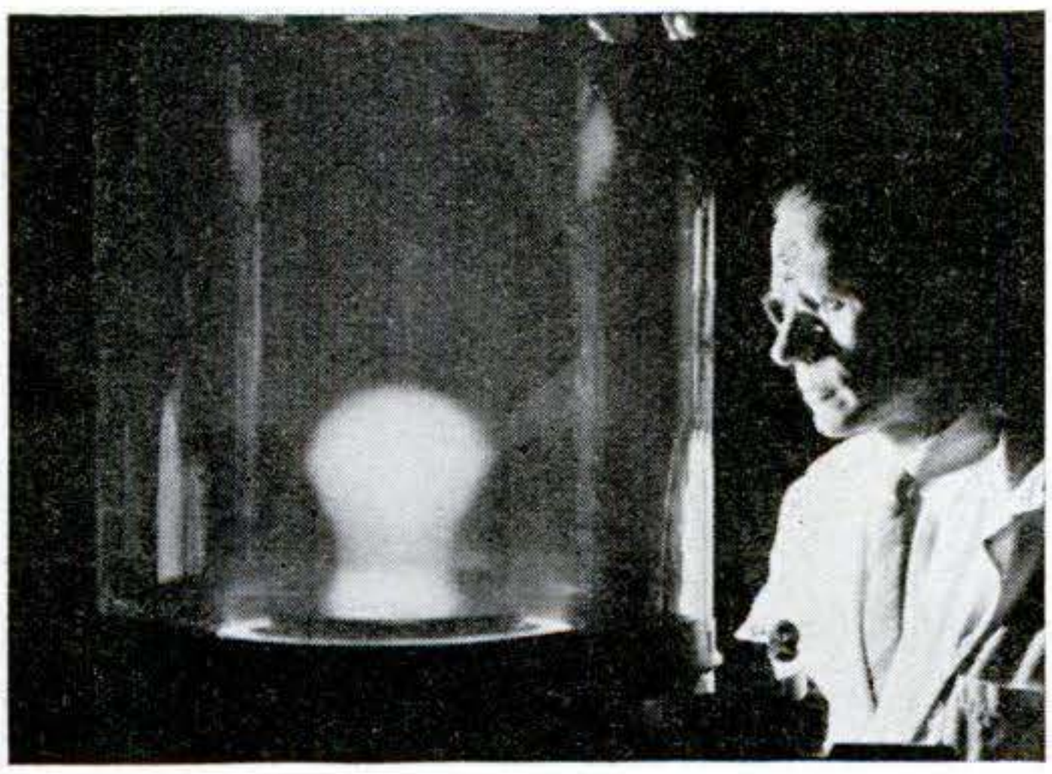
It Took Two Years, But Look at This Californian's 1937 Ford Now

ARMED with only a claw hammer, blowtorch, hacksaw, file and sheet-metal shears, Glenn Johnson of Glendale, Calif., attacked his 15-year-old Ford coupe and chopped and channeled it into this classy chariot that draws whistles as long and low as its new silhouette. Left: instruments were moved to a neat row above the windshield to make room for crash pad. Below: one-piece hood panel extends around nose of car.





"Saucers" Fly in Vacuum Jar

AT FORT BELVOIR, Va., physicist Noel Scott pumped most of the air out of a bell jar, electrified the remainder, then let air in from outside. Varicolored, saucer-like lights glowed. A wave of a magnet caused the "saucers" to move rapidly about. Scott thinks rare atmospheric conditions like those created in jar may explain some flying saucers.

Snowplow Fastens on Bumper

HERE is the lazy man's way to clear off his driveway after a snowstorm. This little, 11½-pound self-adjusting plow can be attached to front or rear bumper with a pair of pliers, quickly removed after use and stowed in car trunk. Inventors A. S. Jaffe and Mike Morris of Cleveland call it the Plowette, hope to market it soon.

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Hollywood Builds Flying Saucers

In* War of the Worlds, *A-bomb-proof spaceships were a headache. It takes technology to build even a make-believe flying saucer.

HOW would you build even a make-believe flying saucer?

That was the toughest problem confronting George Pal, the producer of *When Worlds Collide* and *Destination Moon,* when he set out recently to make a movie of H. G. Wells' famous science-fiction story, *War of the Worlds.*

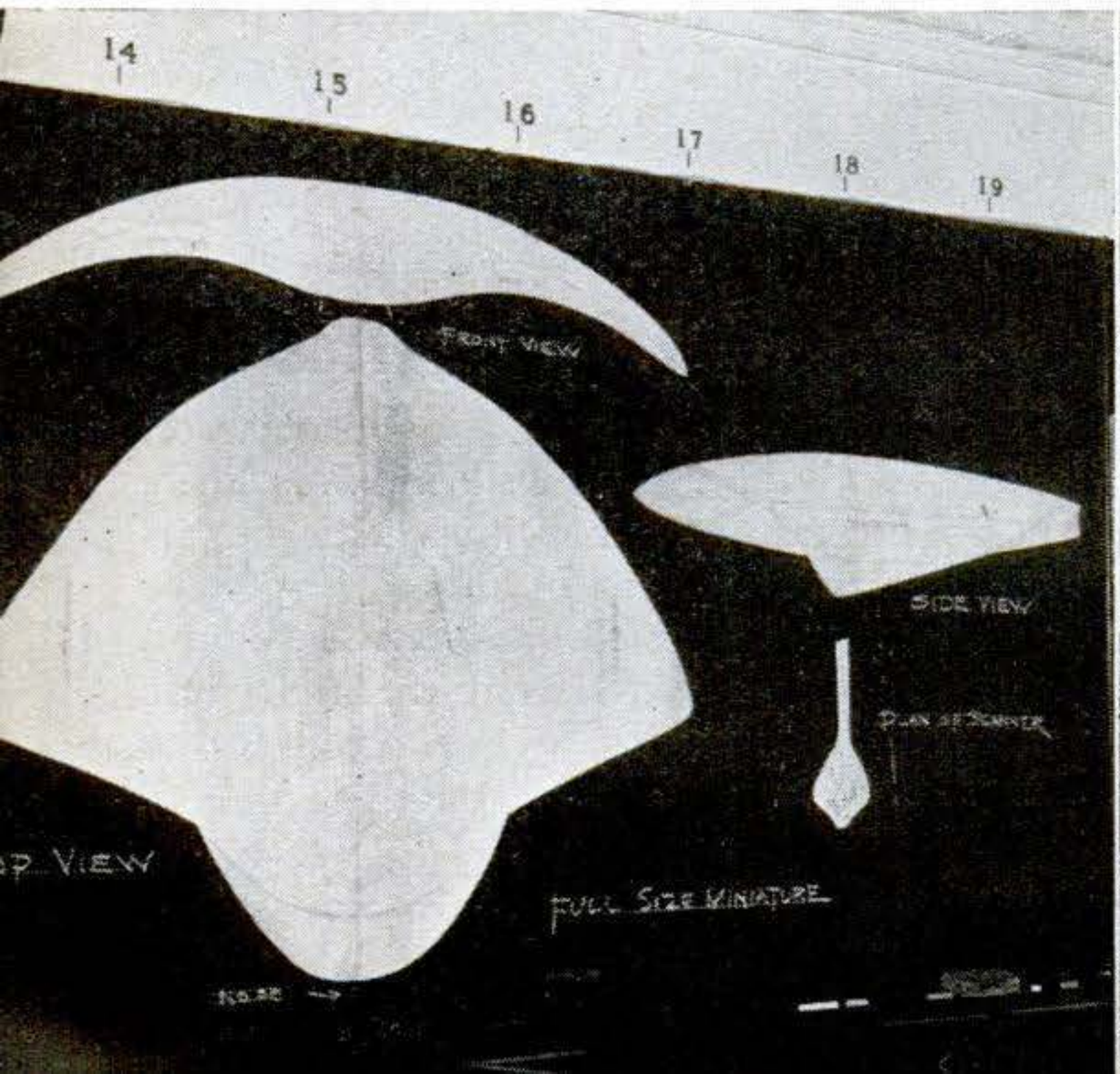
You'll see the result on your local screen when his picture is released. Pal called his studio technicians together and told them to discard all thoughts of antiquated rocket ships. He wanted to set the style for space vehicles of the future. And, in line with Wells' original novel, these Martian blitz machines had to look their deadly part.

That was where Art Director Al Nozaki came in. Roughing in the first of the 1,006 sketches used to set the mood and action of the film, he crossed a flying wing with a flying saucer to produce the aerial devilfish that Pal demanded. A cobra-like death eye, flickering magnetic legs, and an atom-bomb-resistant envelope that spread itself over the space ship with the ease of a motor-operated convertible top, completed tentative specifications.

Then it was up to the model builders. Sculptors tooled the design in plaster, forming a pattern for the workers who produced the three 45-inch copper models used in the actual filming. Windows, to fit nose, wings and wing tips were cast in plastic. Into the 31-pound miniatures went fifteen hundred dollars' worth of special neon and incandescent lighting. Two motors were used to control the cobra head. Magnesium, burned on window screening, provided the fires caused by the saucers as they flew.

The actual flying of the saucers followed

BIRTH OF A FLYING SAUCER, in four easy steps. First, the designer's sketches are converted into mechanical drawings, including top, side and cross-sectional views.

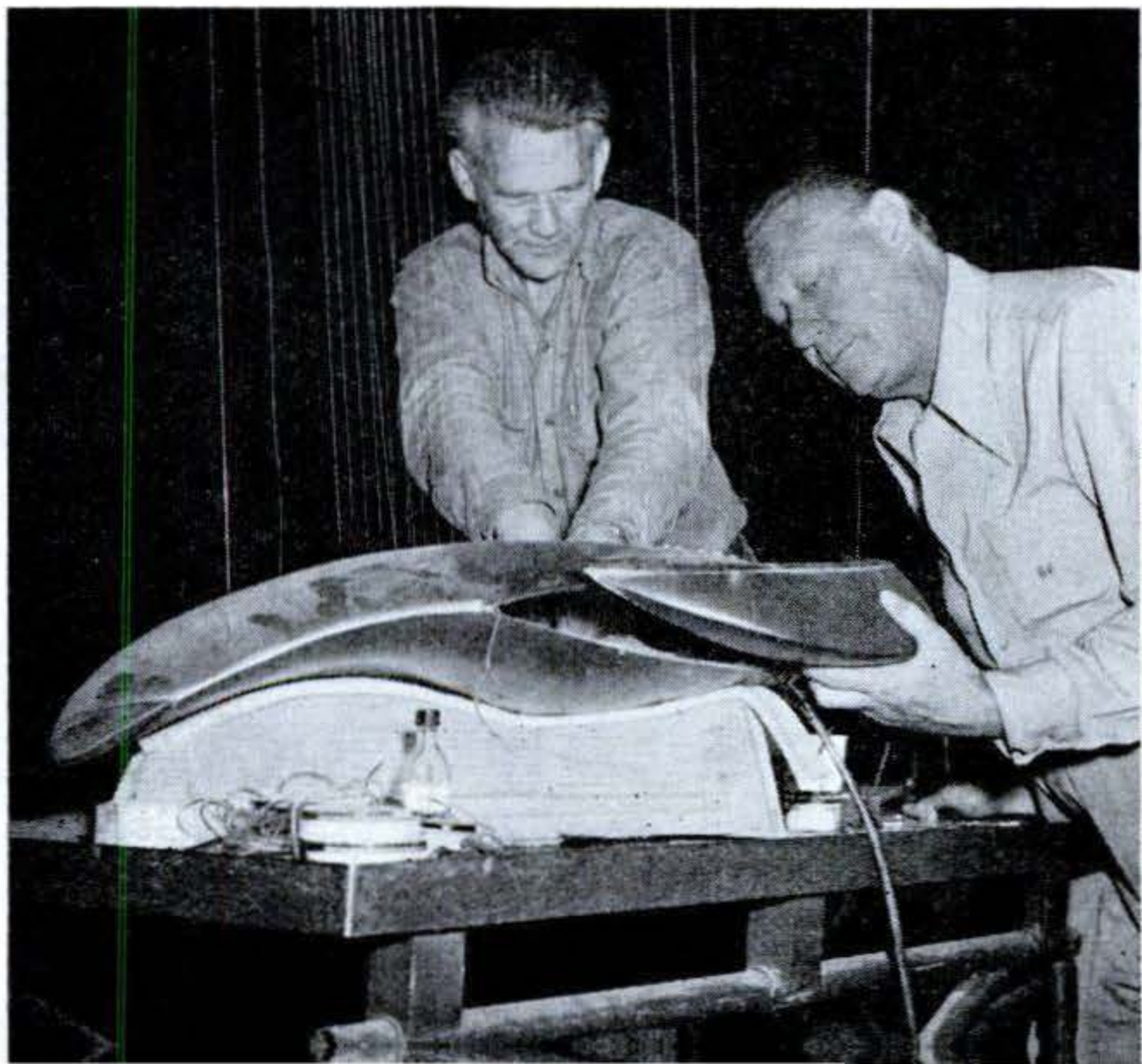


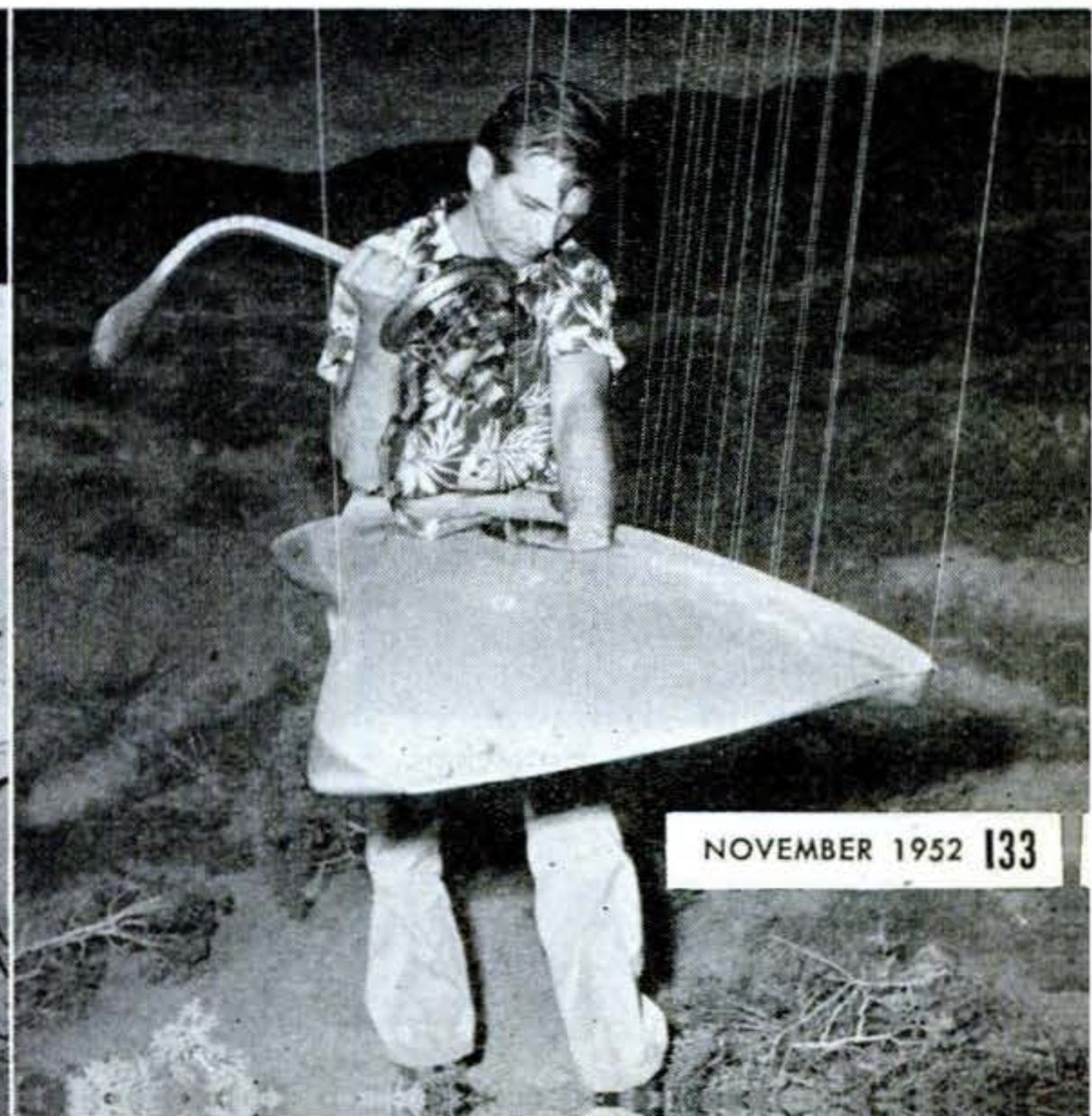
HAND-TOOLED MODEL grows under sculptor's hand. Model is carefully painted and tested for photogenic qualities under a wide range of lighting conditions and camera angles.

HOLLYWOOD'S FLYING SAUCERS resemble aerial devilfish. Wires lead to a movable platform above that "flies" them. Some wires carry current to the saucer motors.

PLASTER IS POURED around the "clay pigeon," then removed and used to form a mold for copper model. Provision is made for adding plastic wing tips and electric lighting.

COBRA-LIKE CONTROL HEAD is drawn into place last, not forgetting to connect the motors which will swivel the death-dealing eye. Hook her up and off she flies!

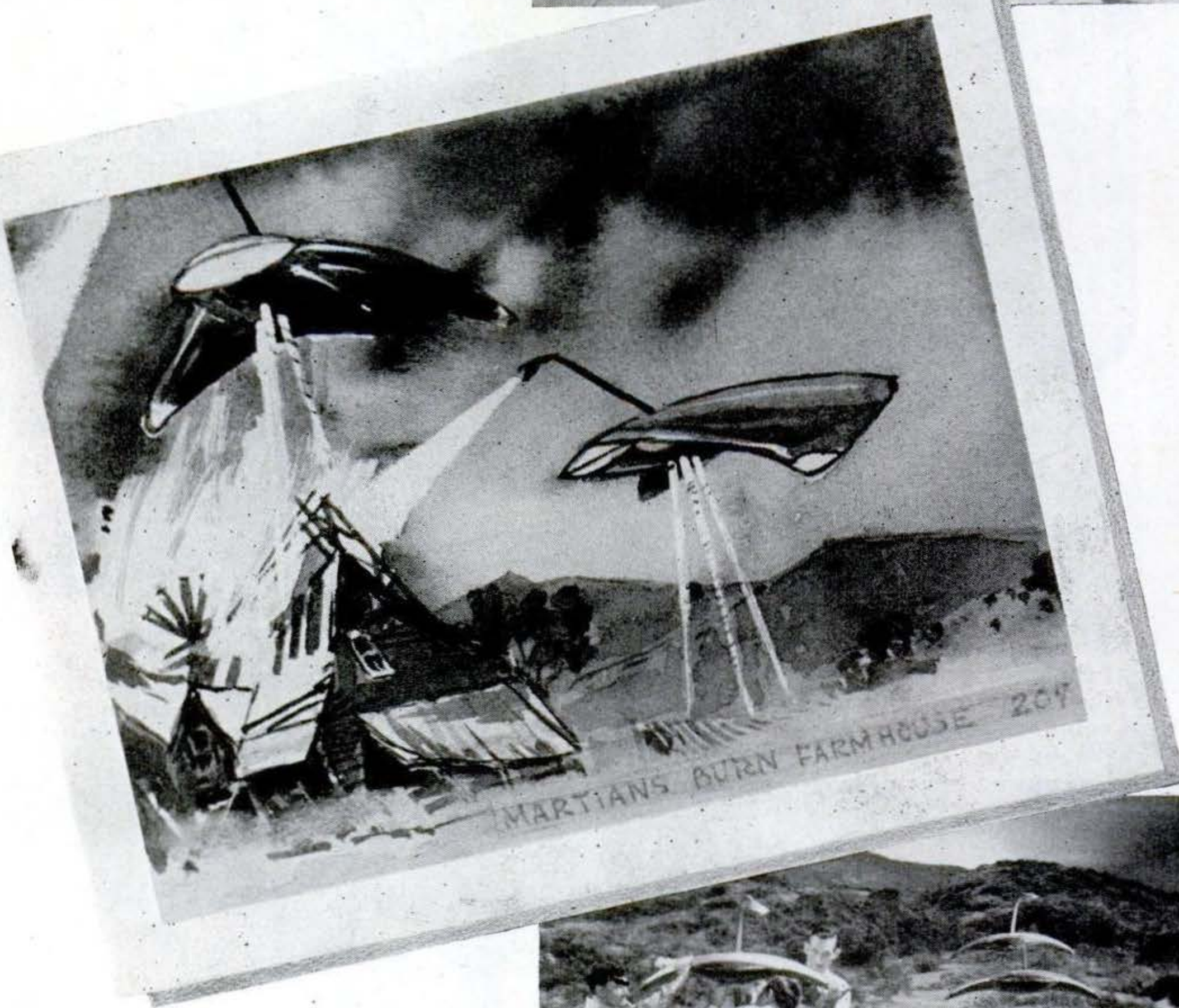


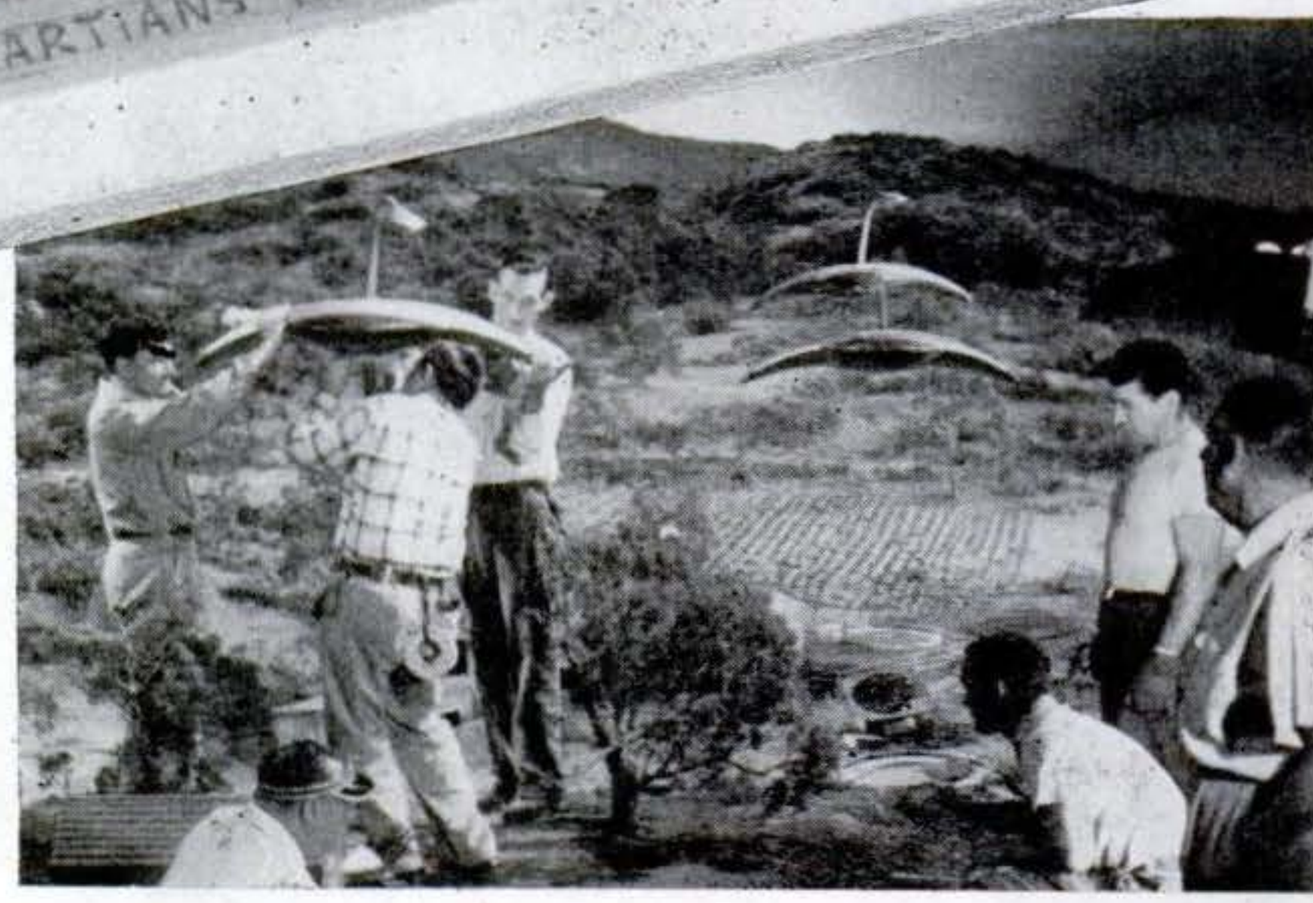


time-tested overhead-wire technique. But the bombproof hood was a puzzler until a series of animated overlay drawings was developed.

Using double exposure, these were superimposed, one at a time, on the corresponding photo frames. The same blending of photography and drawings made possible breath-taking glimpses of flying-saucer victims, military equipment and whole cities being reduced to ashes under the scorching eyes of the Martian Juggernaut. END

ART DIRECTOR AL NOZAKI tilts a small model of the flying saucer, trying out new camera angles for his action-packed sequence sketches.





WATERCOLOR (above) shows Martian spaceship attacking a valley farmhouse—and the results of clay-model study. Nozaki design resembles giant ray, or devilfish.

HUGE STUDIO SET (right) supplies background for much of flying-saucer attack. It represents foothills of Southern California where movie shows Martians landing.

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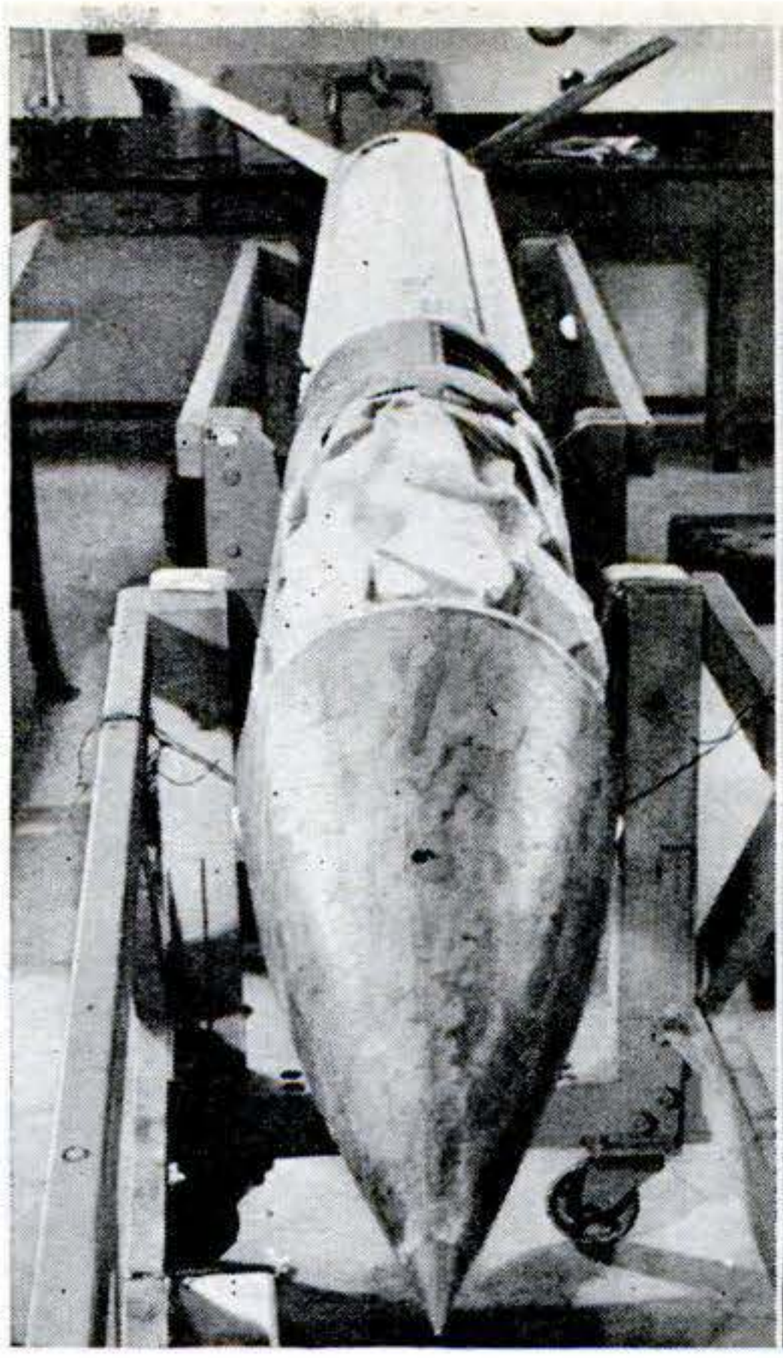
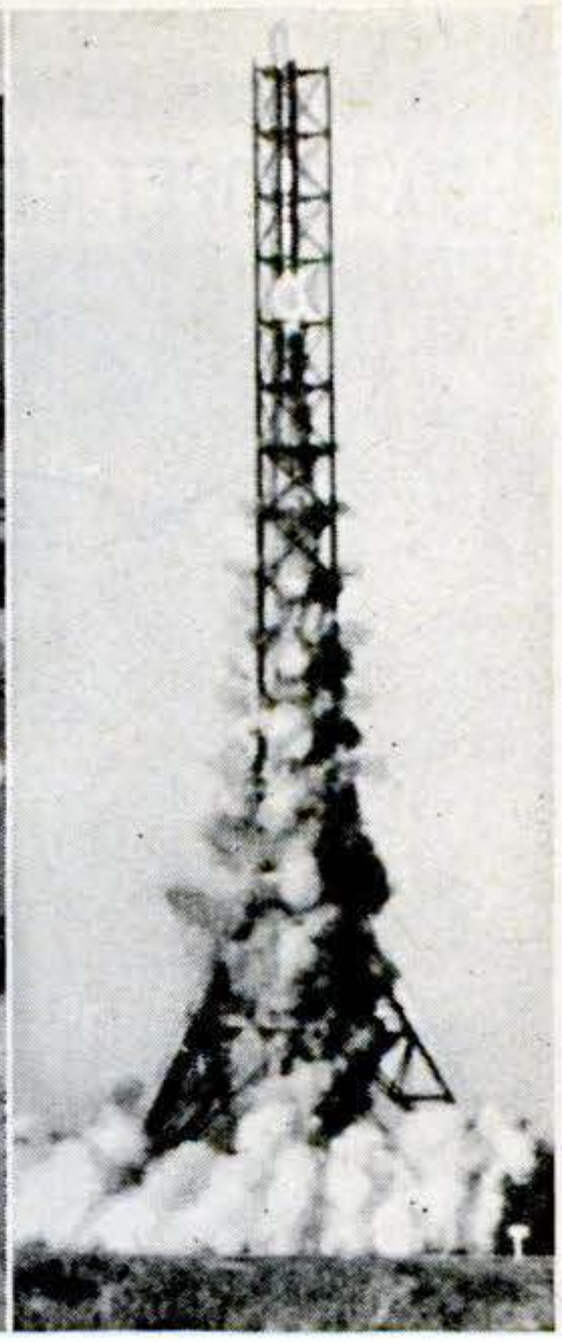
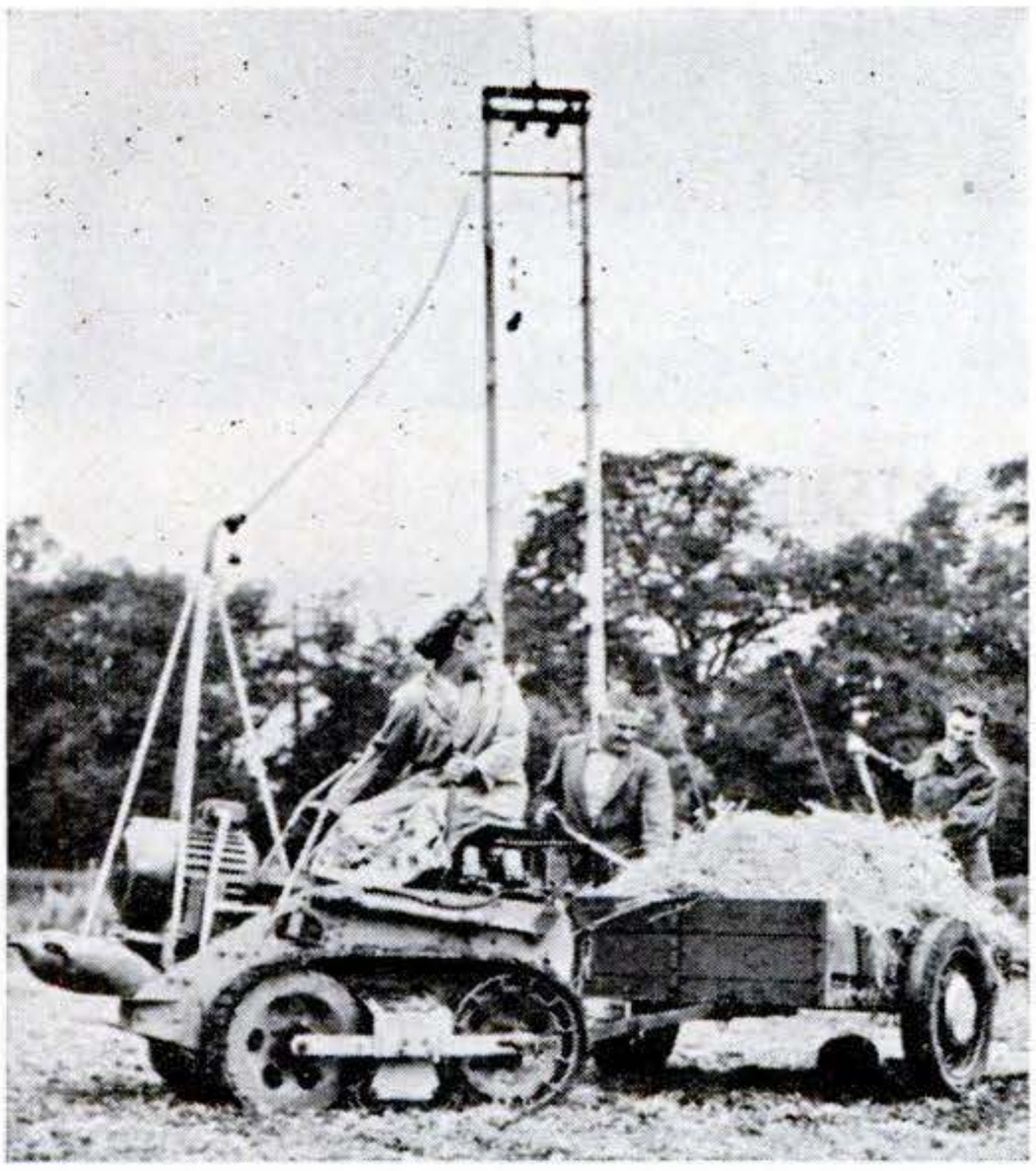
Rocket Shoots Weather Balloon 80 Miles High

SCIENTISTS have found a way to poke their fingers farther into the upper air than ever before, by stuffing a nylon weather balloon inside a rocket and letting it hitch a ride into the stratosphere. As the rocket nears the peak of its flight, pre-set controls allow the self-inflating balloon to pop free. The instruments, contained in a plywood cylinder inside the balloon, start sending weather signals to the ground station below as the rocket falls back to earth.

The photos at right show the balloon stuffed into the rocket just back of the nose cone, and the rocket being fired from the launching tower. The Signal Corps developed it.

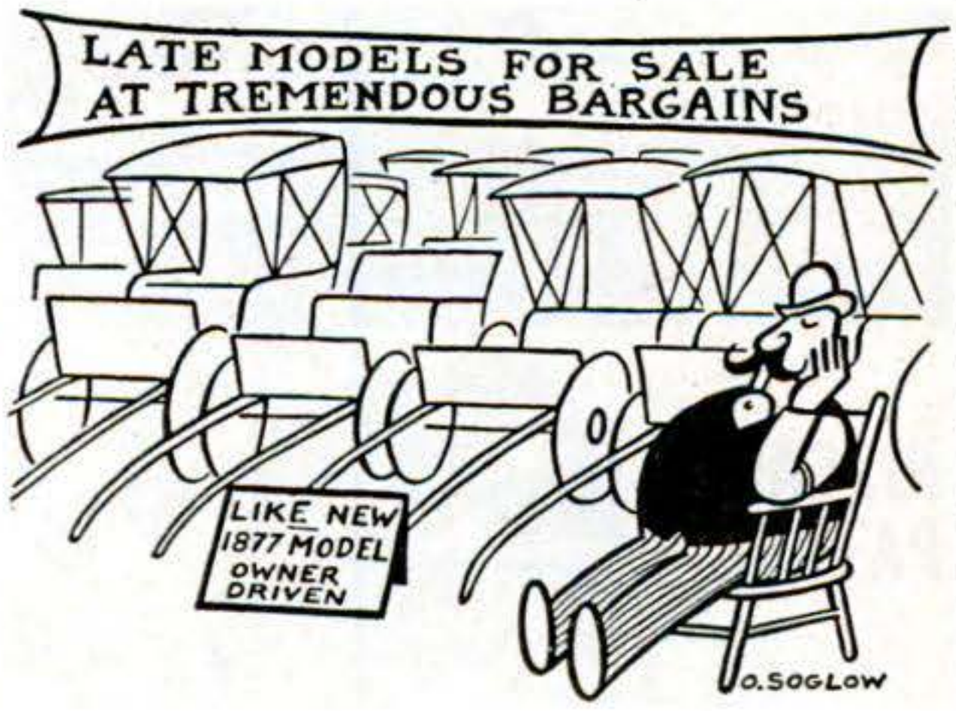






Trolley Powers Farm Tractor

THE trolley tractor above, now being tried out in England, gets its power from a cable connected to a power line. The electric tractor can go all around the power-line pylon. The cable is automatically let out, and counterweights take up the slack when the tractor moves back. According to its inventor, the trolley has three advantages over the usual engine-powered tractor: it is cheaper to run, needs less maintenance and is more powerful for its size.



75 years ago this month

Popular Science Monthly reported:

"POPULATIONS have been passing through the throes of greater social transitions than were ever before crowded into a century. The immense industries created by labor-saving machinery have, in not a few instances, outrun the present demand and the result is a fierce struggle for existence. Nature and Providence are now apparently engaged in starving the surplus humanity back into the cornfields."

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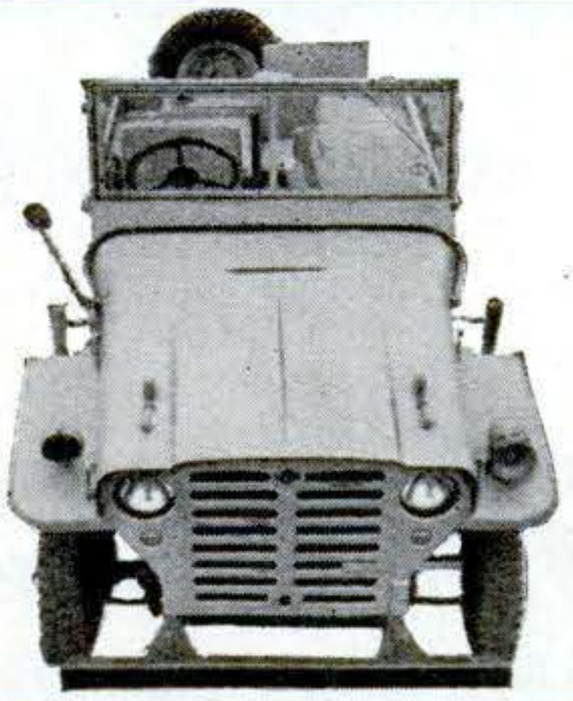
TOYOPET 4-DOOR SEDAN

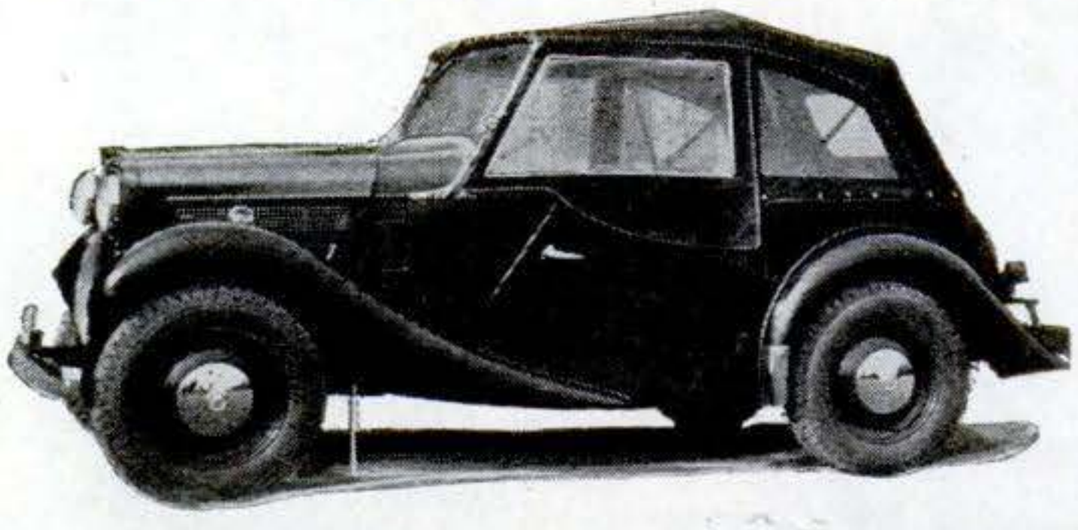
THIS SMART LITTLE CAR, on a 98-inch wheelbase, has four speeds forward, develops 28 hp. at 4,000 r.p.m., will do 44 m.p.h. Front-end styling is reminiscent of De Soto.

NISSAN PATROL



FAMILIAR JEEP-TYPE VEHICLE, used mostly by police, has six-cylinder, 85-hp. engine.

DATSUN SPORTS



MODELED AFTER BRITISH MG, sports car has narrow hood, sweeping fenders, cut doors.

New Japanese Cars Follow U.S., English Styling

LAST year's total output by the entire Japanese auto industry—exactly 12,049 cars—would amount to only a few days' production for one of the big U. S. makers.

Japan is not geared to large-scale auto manufacture. Roads are bad—only 1.24 percent are paved—fuel and steel are scarce, and the average citizen of Nippon cannot

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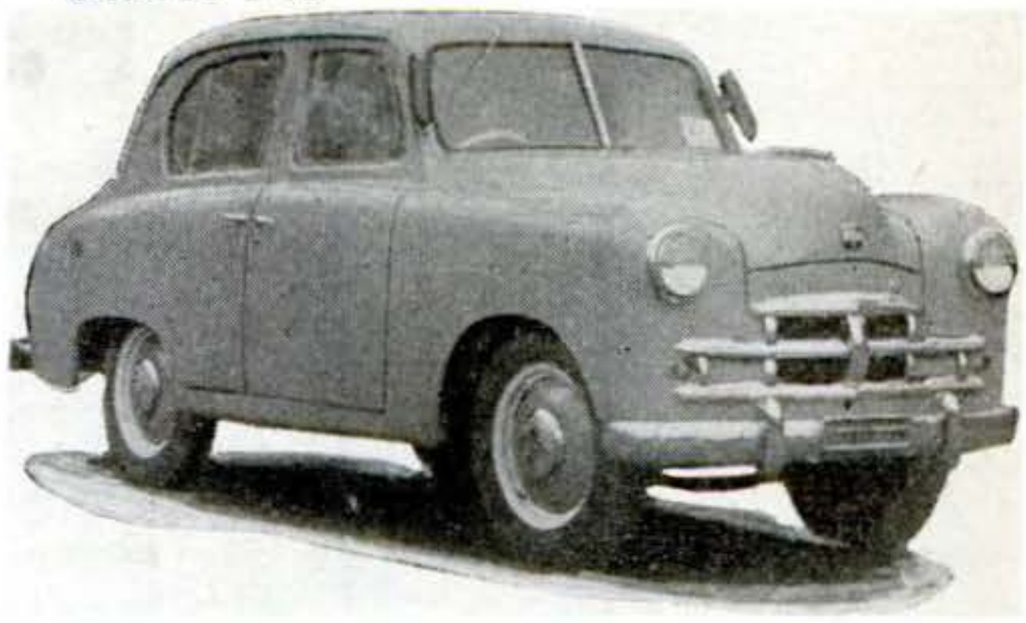
TOYOPET SF

CONTOURS OF '52 NASH can be seen here. Note grille, low hood, high front fenders.

OHTA PA

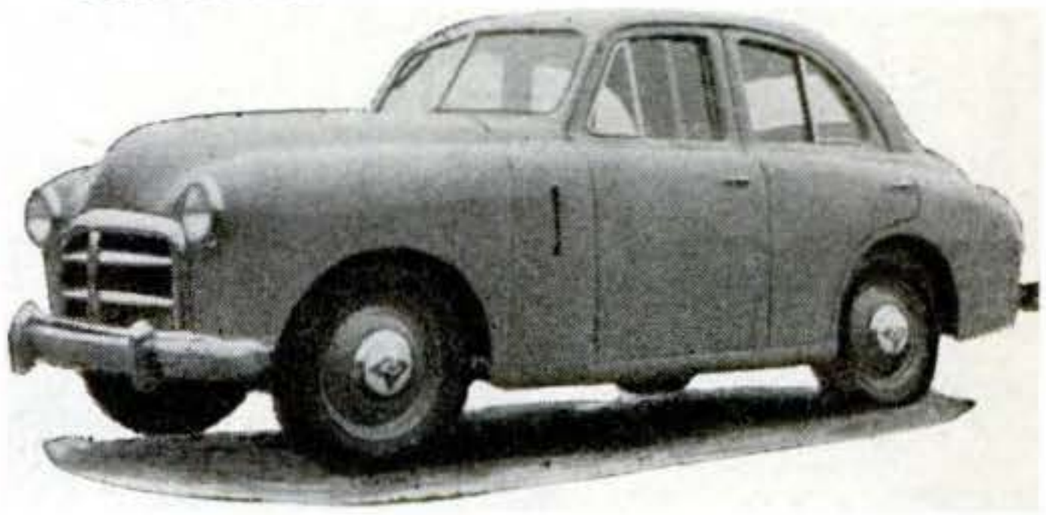


TINY SEDAN has an 82.7-inch wheelbase, but seats four and can travel at 46 m.p.h.

TOYOPET SFK

MAKER CLAIMS 50 MILES TO GALLON for 28-hp. five-seater. Car has wide rear window.

OHTA PB



SLIGHTLY LARGER THAN OHTA AT TOP, 23-hp. PB weighs 1,874 lb. and can hit 50.

DATSUN THRIFT

ANGULAR BODY of this low-cost model seats four people comfortably in small space.

OHTA PE

SHORT WHEELBASE, four-cylinder engine of this Ohta are typical of all sedans pictured.

afford a car of his own. Most Japanese drive motorcycles or motor scooters, or use public conveyances. Only three makes of passenger cars are on the market—the Datsun, the Toyopet and the Ohta. And without mass-production savings, price tags are much higher than on similar foreign cars.

Nevertheless, since the peace treaty was signed, the Japanese Government has encouraged the auto industry, and it is making steady progress. The new models you see here are small, low-powered and poor in performance, but they are rugged and cheap to run. And their smart body lines bear a remarkable resemblance to the latest style trends in America and England.

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the Flashiest

Behind-the-scenes gadgets give ice shows the zip that outdraws baseball.

By Devon Francis

AN ICE show is probably the dizziest accumulation of sleight-of-hand tricks and mechanical contraptions in the entertainment world. But they are well hidden.

Take *Ice Capades*, one of the seven shows playing all over the U. S. this season. From out in front you see performers skate and hear them sing. Only you don't really hear *them* sing: the voices are other peoples', recorded on tape. Then there are

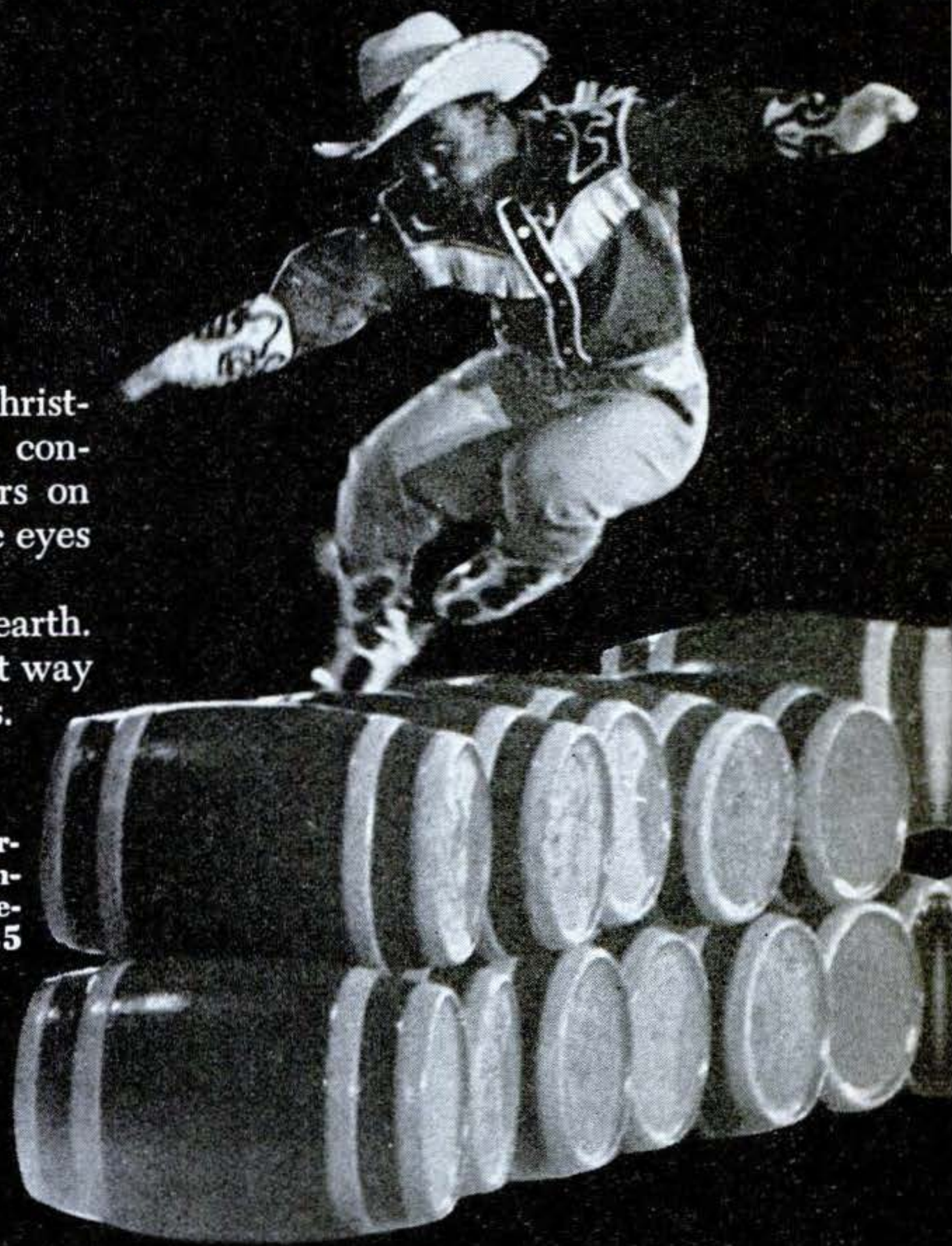
PARISIAN APACHE DANCE, a feature act in flossy *Ice Capades*, lasts less than three minutes. Fast pace quickly exhausts star performers.

DIAPER-CLAD BABY BEAR in comedy act is also Castle, whose small stature fits part.

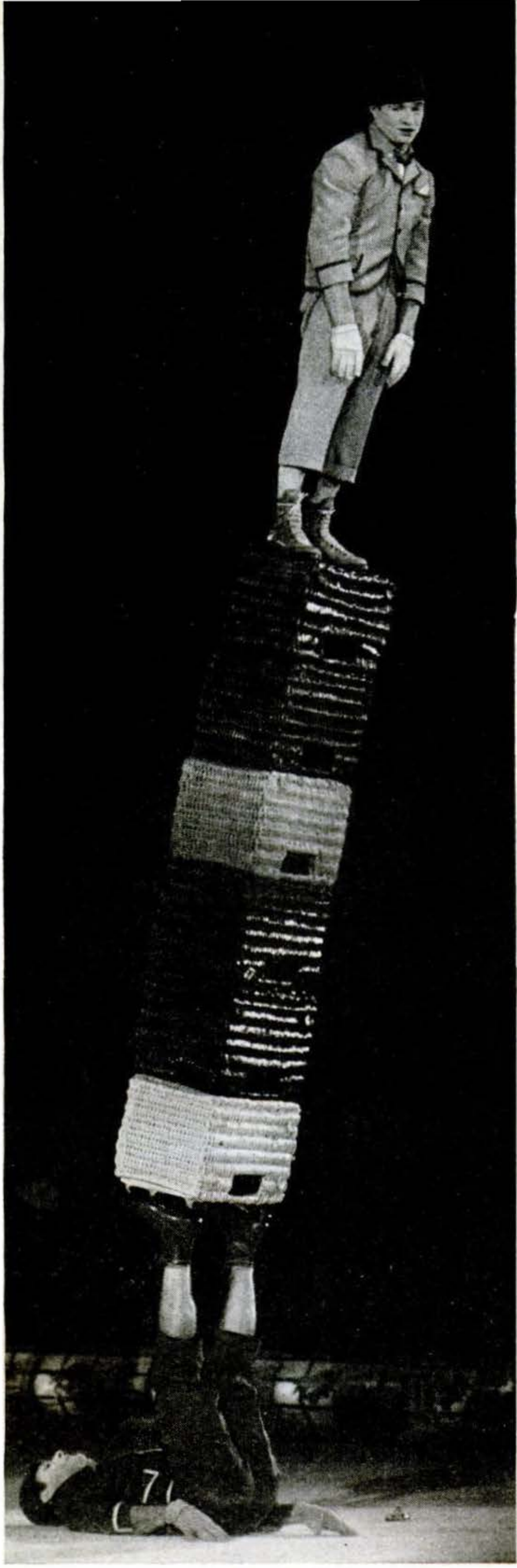
Show on Earth

the ballet girls who light up like Christmas trees (batteries and switches concealed in costumes). And the doors on stage that never miss a cue (electric eyes open them automatically).

Yes, it's the flashiest show on earth. More of the secrets that make it that way are revealed on the following pages.



SPECTACULAR ACTS are dangerous, too, as Paul Castle demonstrates. Spills and injuries necessitate employment of 25 stand-by extras.



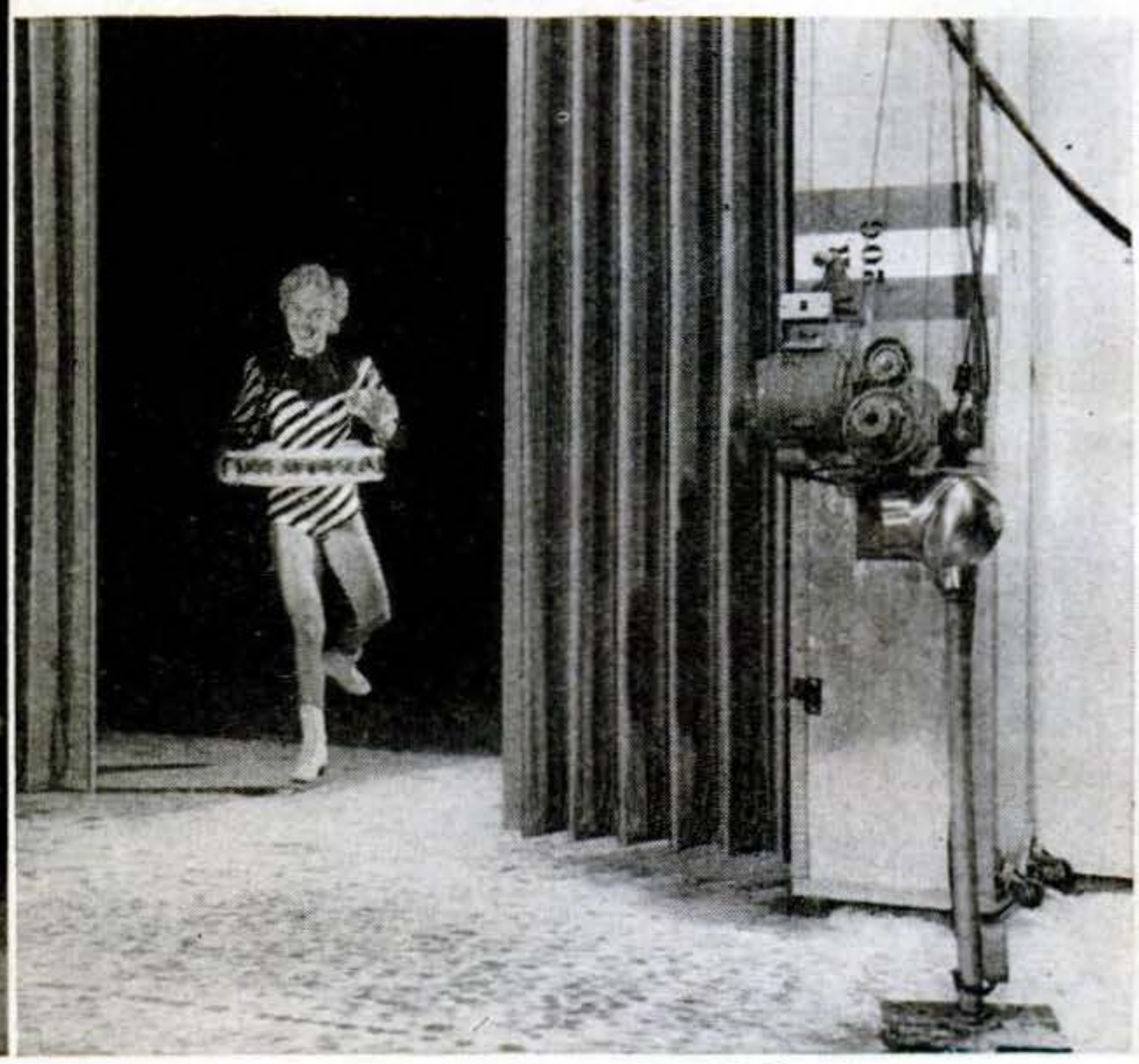
BASKETS are props of Louis Sachse and Max Kitson in a slow-paced climb-and-tumble act.

STOUT HARNESSES will "fly" these pretty skaters right off the ice in aerial ballet.

A Big Array of Gadgets Makes the Ice Show Flashy

WHEN the Ice Capades pony line glides out on the rink for an extravaganza called "My Lady's Boudoir," each girl is weighted down with 65 pounds of costume—including batteries to light up her skirt and headdress.

For an aerial ballet the girls are encased in leather girdles. To these are



AUTOMATIC CURTAINS split and roll back as performer trips electric eye coming off rink.

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SECRET OF THE FLYING BALLET is shown above during backstage rehearsal. Thin but strong wires hung from a heavy steel frame take the girls aloft. Costumes hide the harnesses.

attached wires to pull the performers aloft. The star of the act, Mary Lou Landreville, is held by two wires, one on each hip, at her exact center of gravity to permit her to somersault. The other girls are supported by single wires anchored above the center of gravity.

The top performers themselves become automatons. The "spin," done a number of times, gives the human body the highest rate of self-propelled rotation known. One of the stars has been clocked by movie film at 288 revolutions per minute.

The ice itself causes many headaches. The orchestra's piano must be heated electrically to keep it in tune—moisture from the ice tends to swell the wood. The ice must be kept "soft" so that the skaters' blades will dig in for a firm footing.

Speed and spectacle have made ice shows popular everywhere. The road shows alone—not counting hotel acts—play to more people each season than major-league baseball.

FLOWERS LIGHT UP on these costumes. Girl at right reveals hidden batteries on her hips.

SPINNING requires rocker-type skates. Special machine (lower right) grinds hollow edges.

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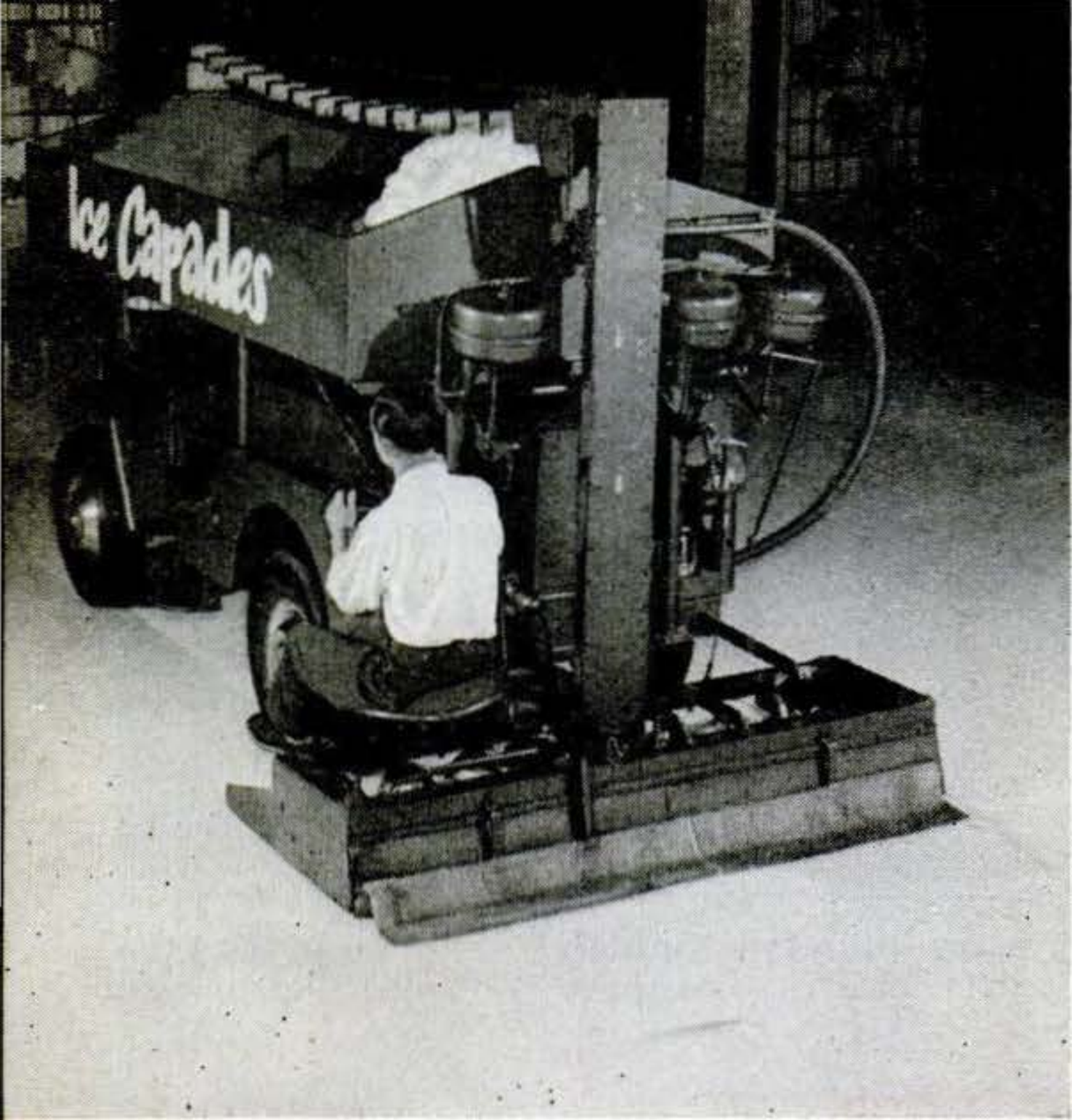
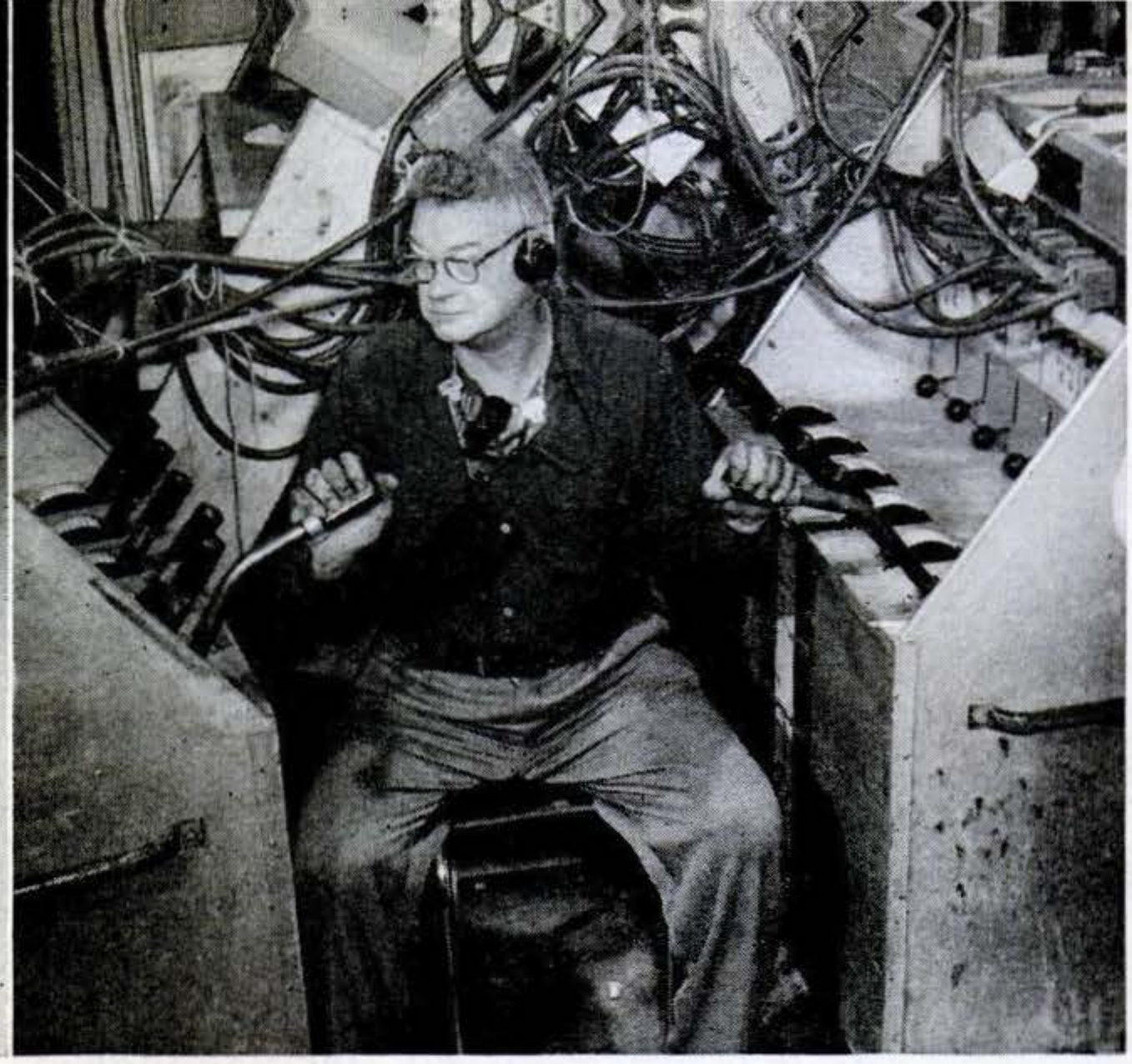


CONDITIONING MACHINE scrapes ice smooth, leaves warm-water film that freezes quickly.



DIMMER PANEL controls lights on sets as well as "dash" lights on bangboard at border of rink.

The Ice Show Is Run by Men You Never See

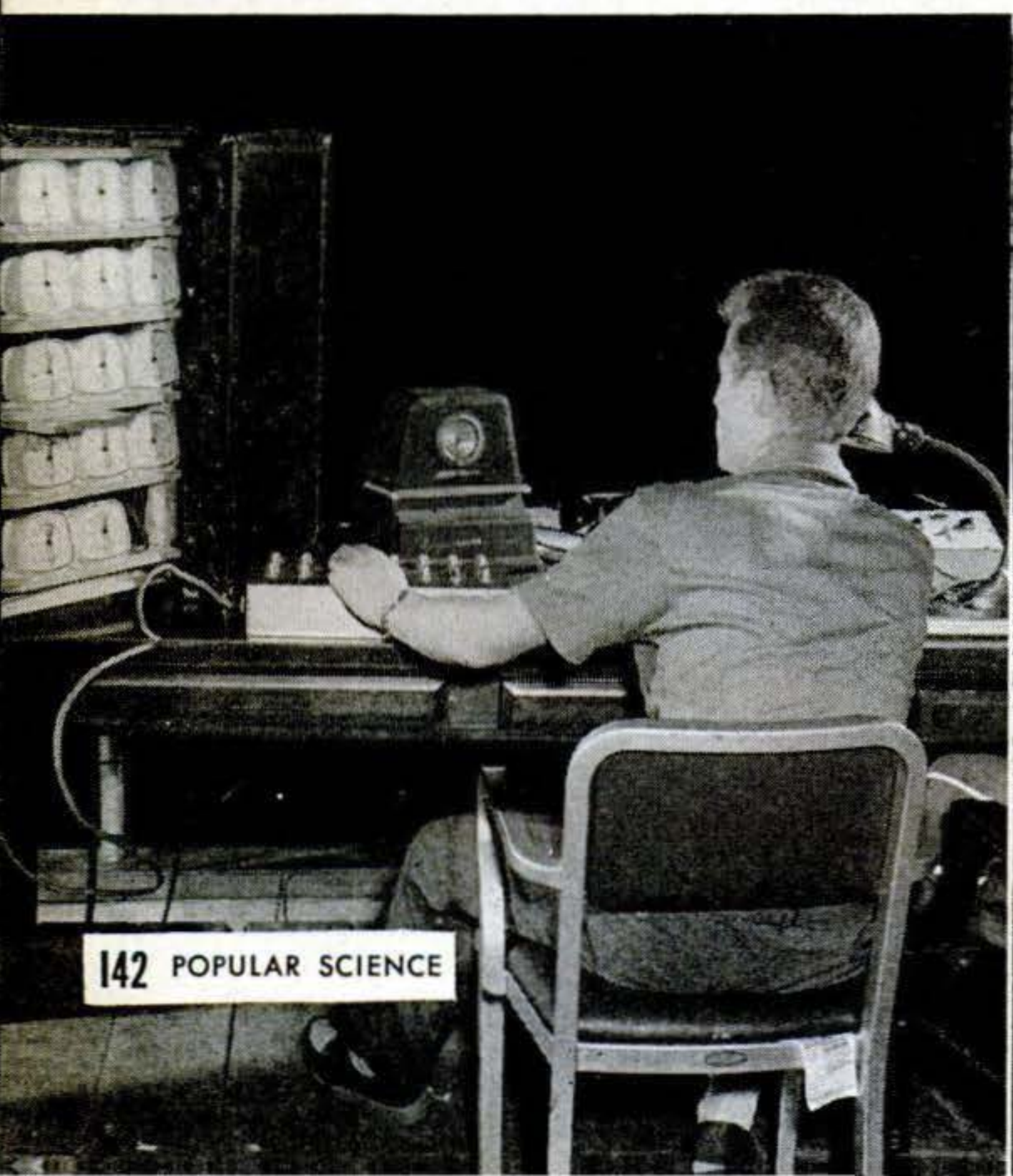
AN ICE show goes off smoothly only because of the men behind the scenes.

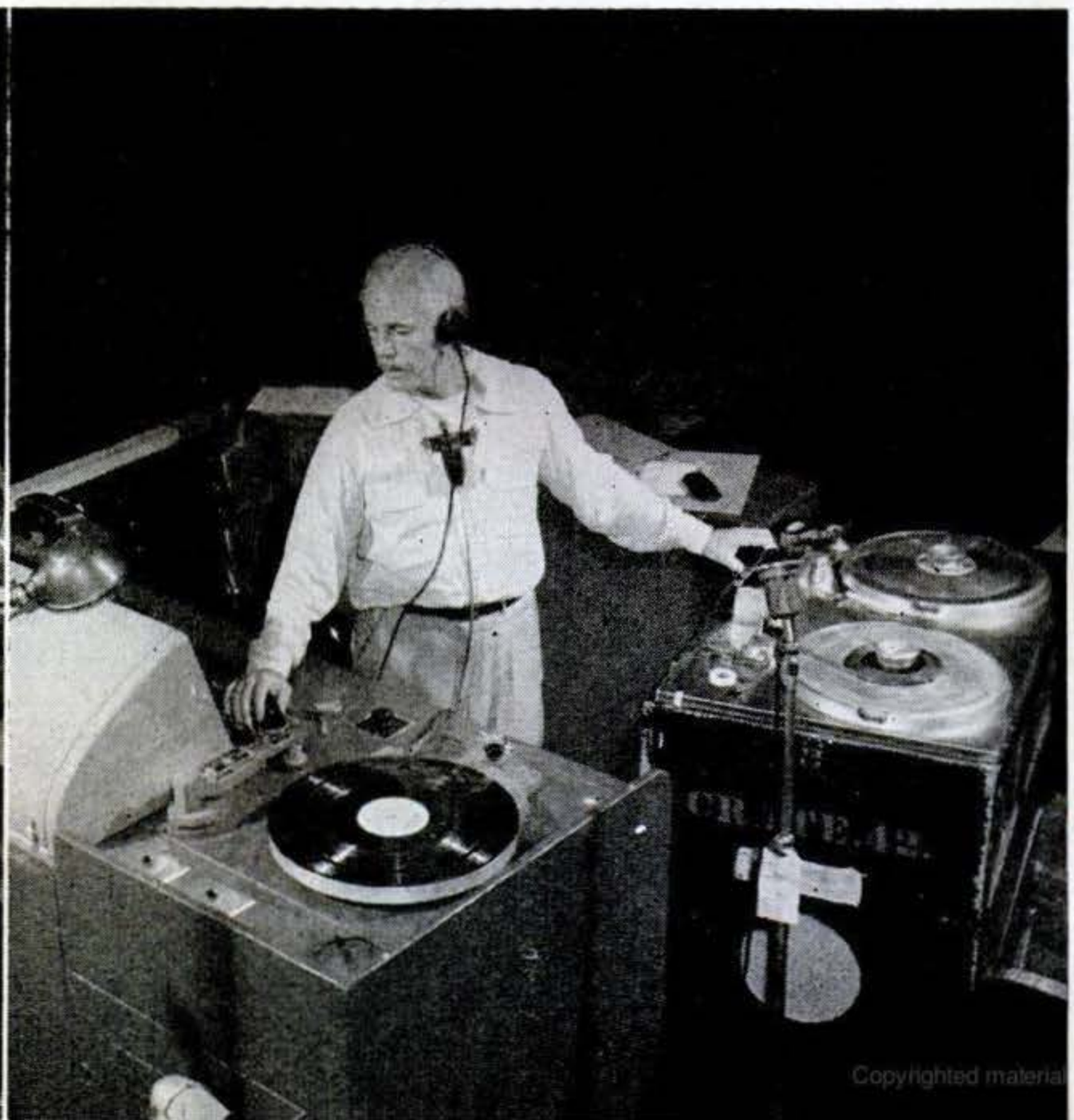
Acts are on split-second schedules. The entire show is directed through a telephone system linking the master of ceremonies, orchestra, stage director, lighting technicians and dressing rooms. In the 2½-hour performance there are 7,000 cues, 5,000 for the flood and spotlights alone.

The singing and speaking voices coming from the loudspeaker system in the musical *Brigadoon* are those of other actors recorded on magnetic tape. This gives the play voices of top quality and does away with microphones. Action, live music and lighting cues are synchronized with the tape. The stage is ice two inches thick on a 70-by-160-foot rink, made by brine circulated through tubing in floor.

BATTERY OF CLOCKS (left below) times acts for light director, who cues 16 operators.

SYNCHRONIZING VOICES on magnetic tape with live orchestra is job of Brian McDonald.





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Wide decorative border is painted on the rink, then covered with an inch-thick layer of ice.

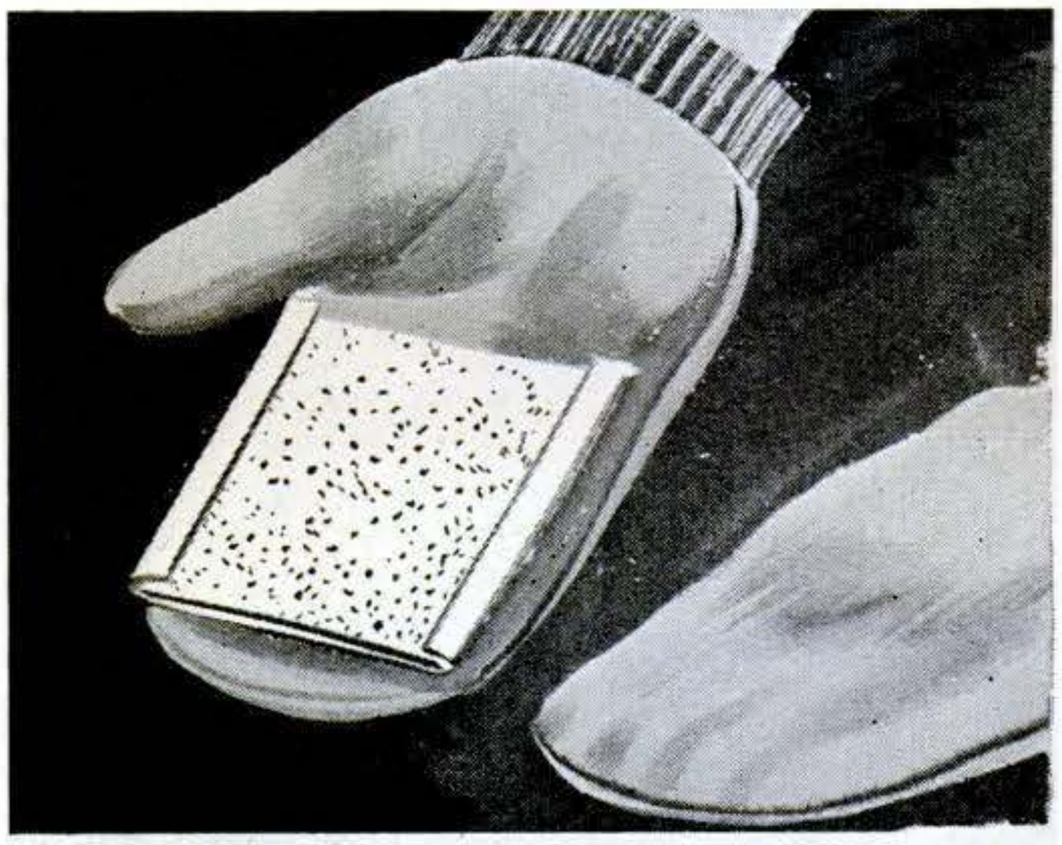
Broadway musical hit *Brigadoon*—on skates—is chief attraction of *Ice Capades*' new season.

I'd like to see them make...

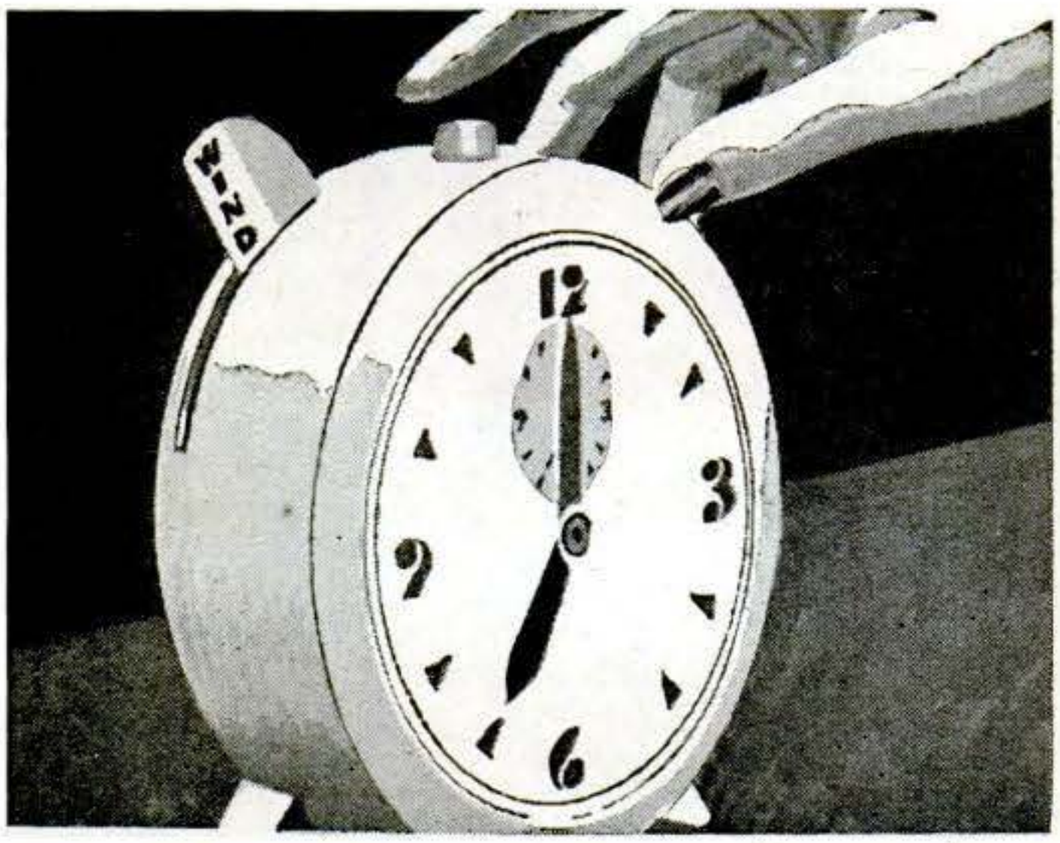
Everyone has his own pet idea of some gadget he would like to see in general use. What is YOURS? *Popular Science Monthly* will pay $5.00 for each one published. Use government postcards only. Contributions cannot be acknowledged or returned.

WAX PAPER printed in assorted colors and designs for quick identification of sandwiches, or of leftovers in the refrigerator. —*Robert Kanan, Colorado Springs, Colo.*

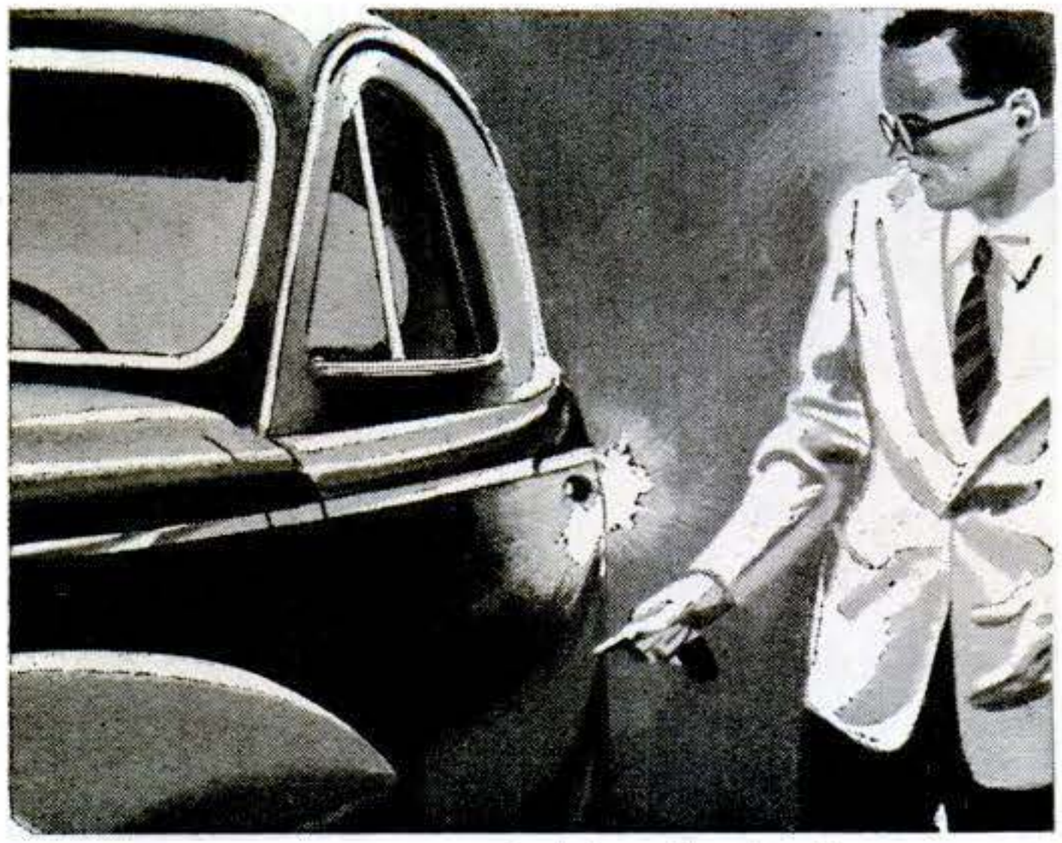
A BUILT-IN CAR BLANKET for rear-seat passengers. It would pull up from the bottom of the front seat and roll back when not in use.—*M. Glennon, Larchmont, N. Y.*



A MITTEN-TYPE WORK GLOVE with a slot under the fingers to hold a piece of sandpaper. It would save the hands and speed up the job. —*Phil Lynch, Scarsdale, N. Y.*



AN AUTOMATIC SIGNAL DEVICE, for an alarm clock, that would pop up to indicate when the clock needed rewinding.—*Herbert E. Fey, New Braunfels, Tex.*



A SMALL LIGHT mounted in the lock on a car door to warn the driver, before leaving car, that he had left the radio or other accessories turned on.—*Myron Steir, NYC.*

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New .22 Is Dustproof, Foulproof and Foolproof

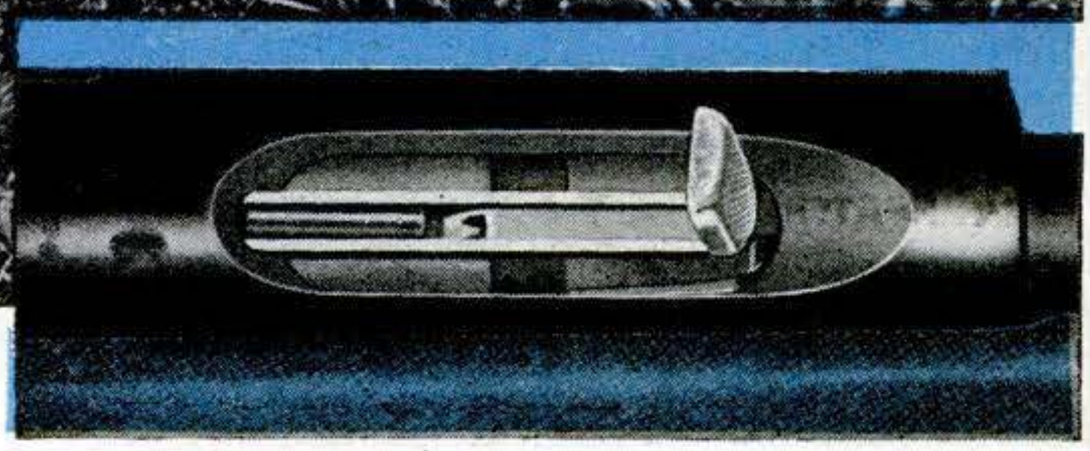
Unusual features built into this new semiautomatic rifle make it easier and safer to handle.

SMALL-GAME hunters, varmint shooters and tin-can plinkers will find some unusual features—aimed at increasing efficiency and safety of operation—in this low-cost, .22-caliber rifle.

To help keep dirt out of the action, the clip-fed repeater—unlike other American semiautomatics—has only one opening, the ejection port, between the mechanism and the gun's exterior.

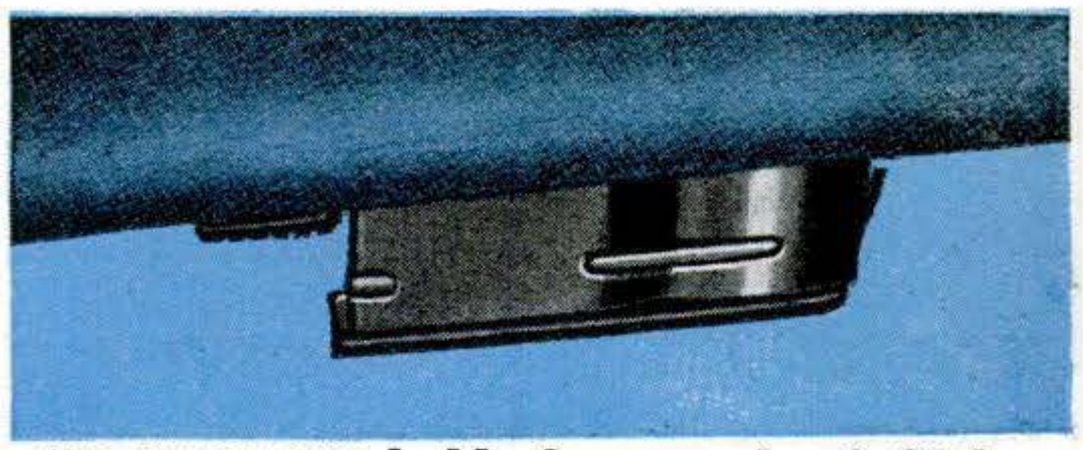
A new method of bolt support, with three grooves running the length of the receiver, provides passage for the burned-powder residue that produces fouling and may cause jamming. The gun cannot be stripped when cocked, nor fired when it is being taken down. A protected clip release helps keep the magazine from dropping out accidentally.

Made by the Marlin Firearms Co., the new rifle, called the 89-C, will be available to shooters sometime this fall.



SIDE EJECTION PORT is the only horizontal opening into the new gun's action from outside. Cocking-handle spur is on the bolt.

BACK PLUG, at rear of receiver, has a lock on the side. When released, gun may be quickly disassembled for cleaning and oiling.



CLIP MAGAZINE holds five rounds of .22 long rifle ammo. Concealed magazine catch prevents accidental release. Gun has spare clip.

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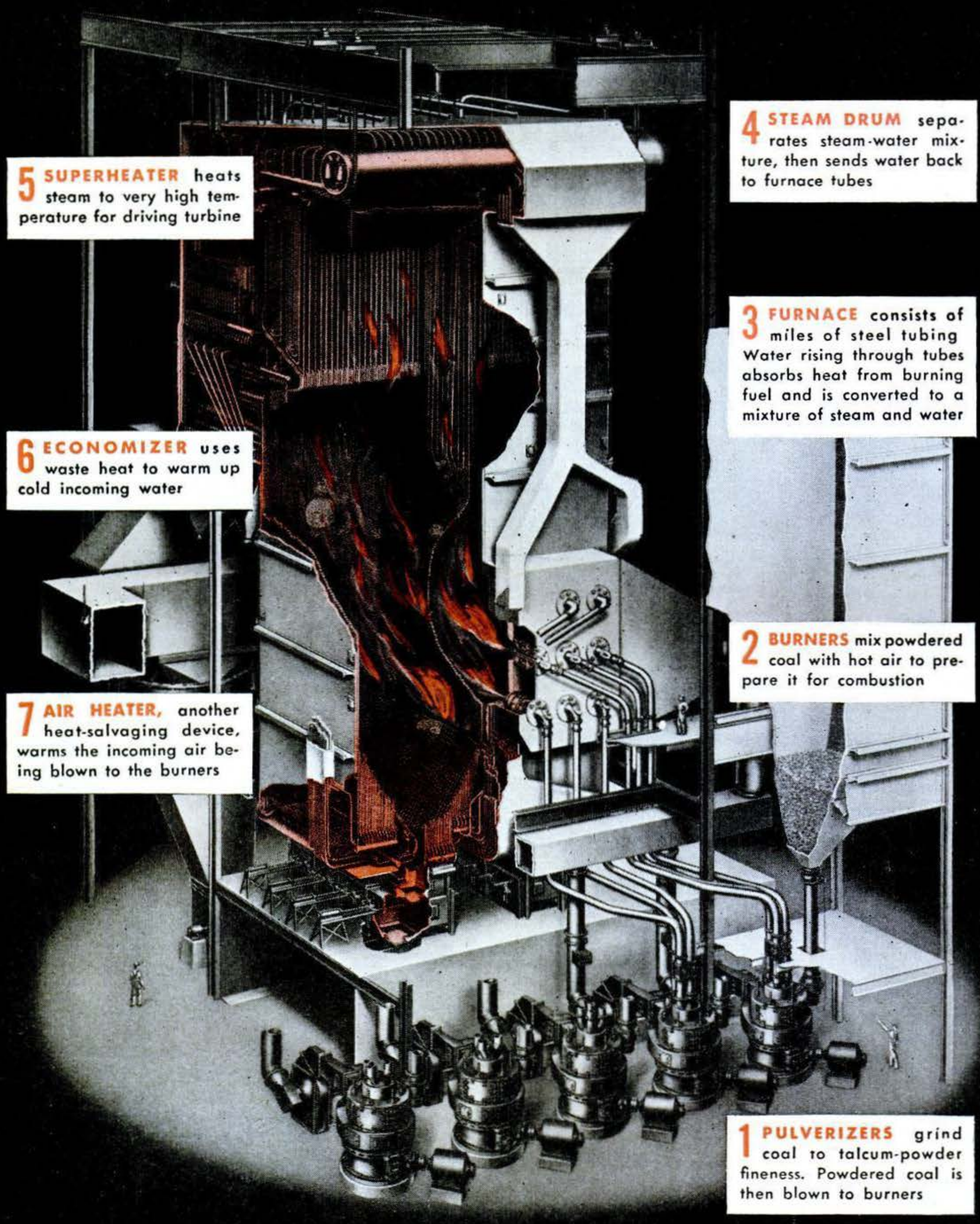

3,000-Ton Boiler Dwarfs Its Operators

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How They Make

Boilers 14 Stories High

Boilermakers—1952 model—wear spacemen's suits and work their gaily painted, quiet machines by pushing buttons.

By Henry B. Comstock

THE plant that makes the steam that makes electricity for a big city bears about as much resemblance to James Watt's first boiler as a built-in fluorescent light does to a whale-oil lamp. It's big. A single modern unit—they call them "steam generators"—may stand 14 stories high. It's heavy. The weight may run to 3,000 tons, more than a destroyer. And it's flexible. Suspended from its steel skeleton, the huge mass will expand and contract like a human lung in response to 1,000° temperature variations.

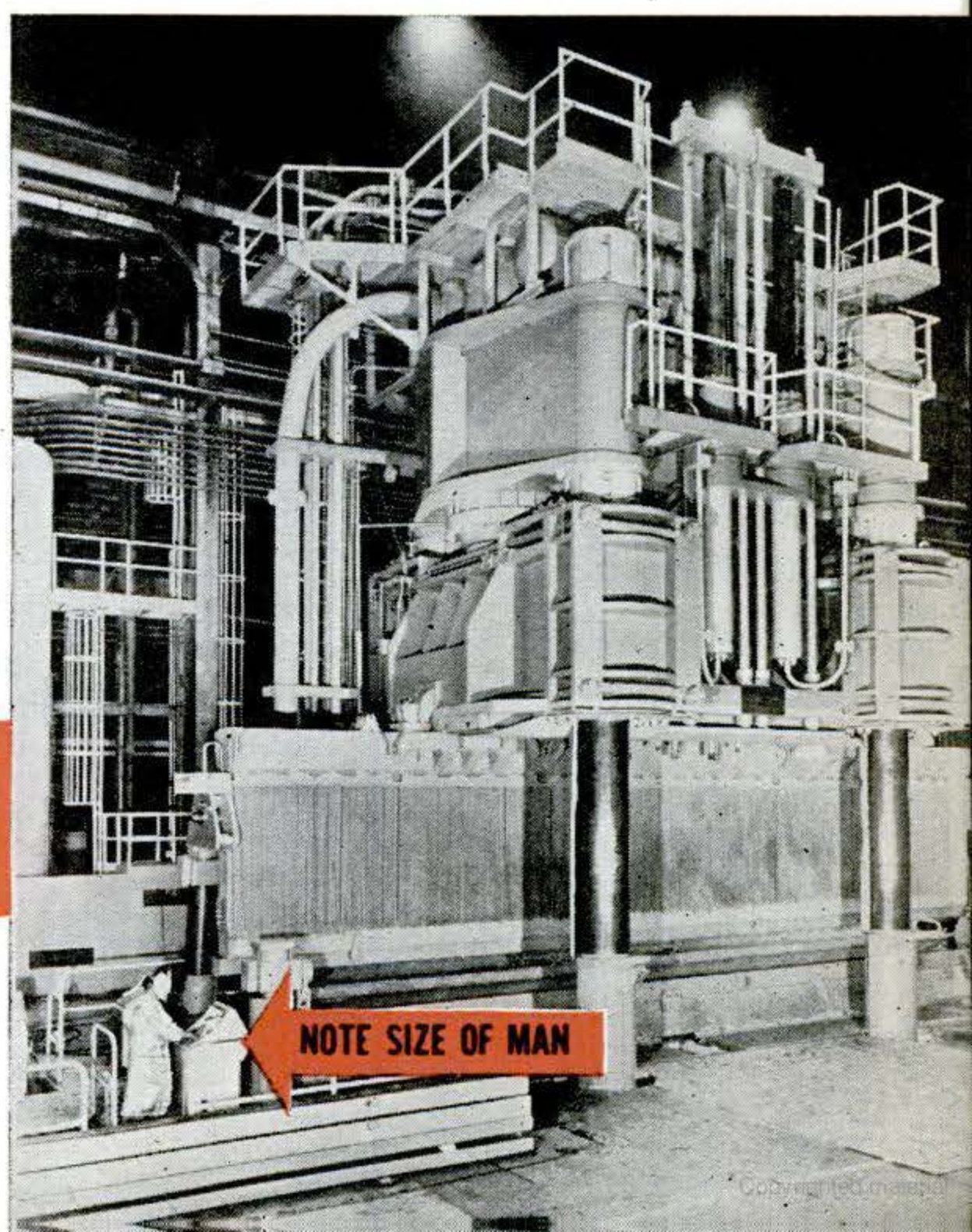
No simple tank with a fire underneath, such a boiler generates steam inside tubes: 85 miles of seamless steel tubing that provide a third of a million square feet of heat-absorbing area, enough to cover 11 football fields. Now picture each of those fields covered with half an inch of water and swept by an inferno of flames and gases, roaring across it at 200 miles an hour. That gives you a rough idea of the punishment the boiler must take to generate 1,250,000 pounds of steam an hour—enough to supply all the power for a city like Houston.

Manufacturing such a boiler is not unlike building a battleship, and I was set for a good show when I dropped in recently at the Barberton (Ohio) Works of The Babcock & Wilcox Co. B&W is to boilermaking what Paul Revere once was to silver teapots; for 85 years this outfit has been hammering iron and steel into steam-generating equipment of ever greater capacity. The world's largest producer of industrial boilers, it rolls out 2½ miles of blueprints each day, and then converts them into tough reality.

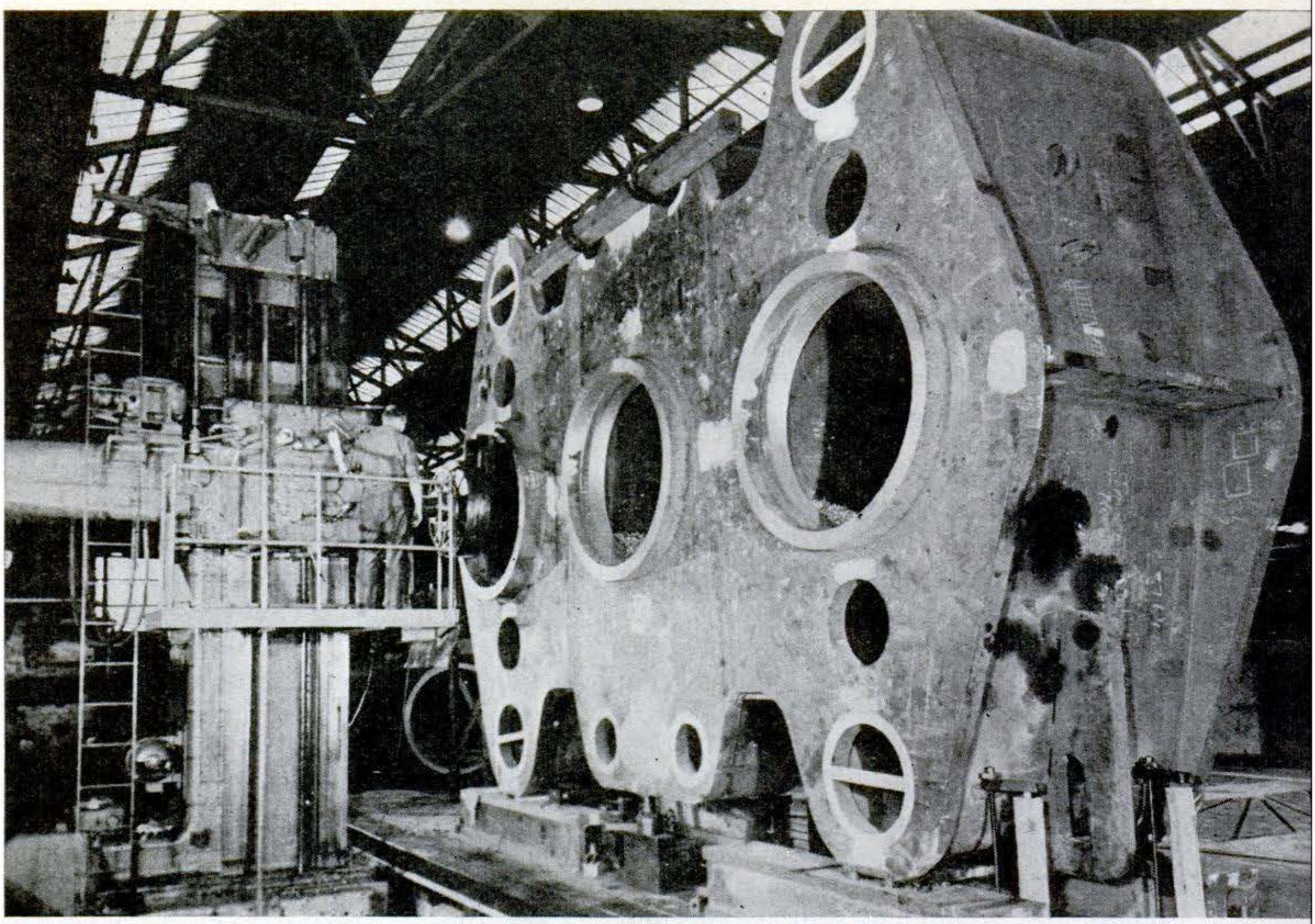
Drama in Boilermaking

I knew that the Barberton Works had been doing a lot of retooling, and that the man to tell me about it was an engineer named Tom Shank.

The young man who met me in the



So Does Press That Makes It



Boiler Press **Because the massive parts that were needed could not be shipped in from other manufacturers, Babcock & Wilcox built its 1,200-ton press for forming boilers "on location." The top, or stationary platen (above), weighs 115 tons, and had to be hauled more than 400 feet on special track to the new press building. There, perched on four 52-foot-high supporting columns, it houses the three big cylinders which are the muscles of the power-packing machine.**

hotel-like offices was no product of the scarfing hammer and rabbling bar. His gray flannel slacks were pressed to a razor's edge, and when he spoke of bending six-inch boiler plate you somehow got the idea that one pressing operation was as simple as the other.

"We'll have a look at the ingot-heating furnace first," Tom Shank said. "I'd suggest that you leave your coat right here. You'll be more comfortable."

Looks Like a Movie Studio

That sounded like the understatement of the year. But I was beginning to suspect that the old boiler factory had had its faceplates lifted. The notion became a certainty a moment later, when we entered the press and draw-bench shop.

Here was no dimly lighted, scrap-filled corridor, charged with acrid smoke and the deafening ring of sledge on steel. Instead, the newly painted, nine-story-high hall looked like a super-colossal movie studio, with half an acre of freshly washed windows substituted for the klieg lights.

Near one end of the gallery stood the principal "set," a fantastic assembly of giant plates and castings poised on four tubular legs and girdled by a grillwork of ladders, catwalks and guard rails. In spite of its huge bulk—it stood some 60 feet high from pit bottom—the machine looked strangely light and unreal.

No small part of that effect came from its color scheme. Believe it or not, the basic framework was painted a soft, pastel green—"Easy on the eyes," Tom explained. In contrast, and for the safety of

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the operators, all handrails and stanchions were accented in bright canary yellow. The moving parts were traced in orange, and the heat-affected areas were a dull battleship gray.

Captain Video Takes Charge

"Looks like we're just in time to watch the space cadets take off for a bowl of corn flakes," I said, pointing to half a dozen small figures in heat-resistant aluminum-treated coats, who had gathered at the base of the contraption.

"That," said Tom, matter-of-factly, "is our new vertical press. It's strictly a homemade job—the heaviest and most powerful boiler-plate-forming press in the United States."

While he was talking a warm orange glow had begun to creep across the floor. I turned and saw a section of the steel wall behind us rise soundlessly. Behind it lay the steel-heating furnace, its ranch-house-size interior a blob of incandescent firebrick. At its foot lay a single 26,000-pound ingot. Octagonal in shape, its blunt nose was as bright as a highway stop sign.

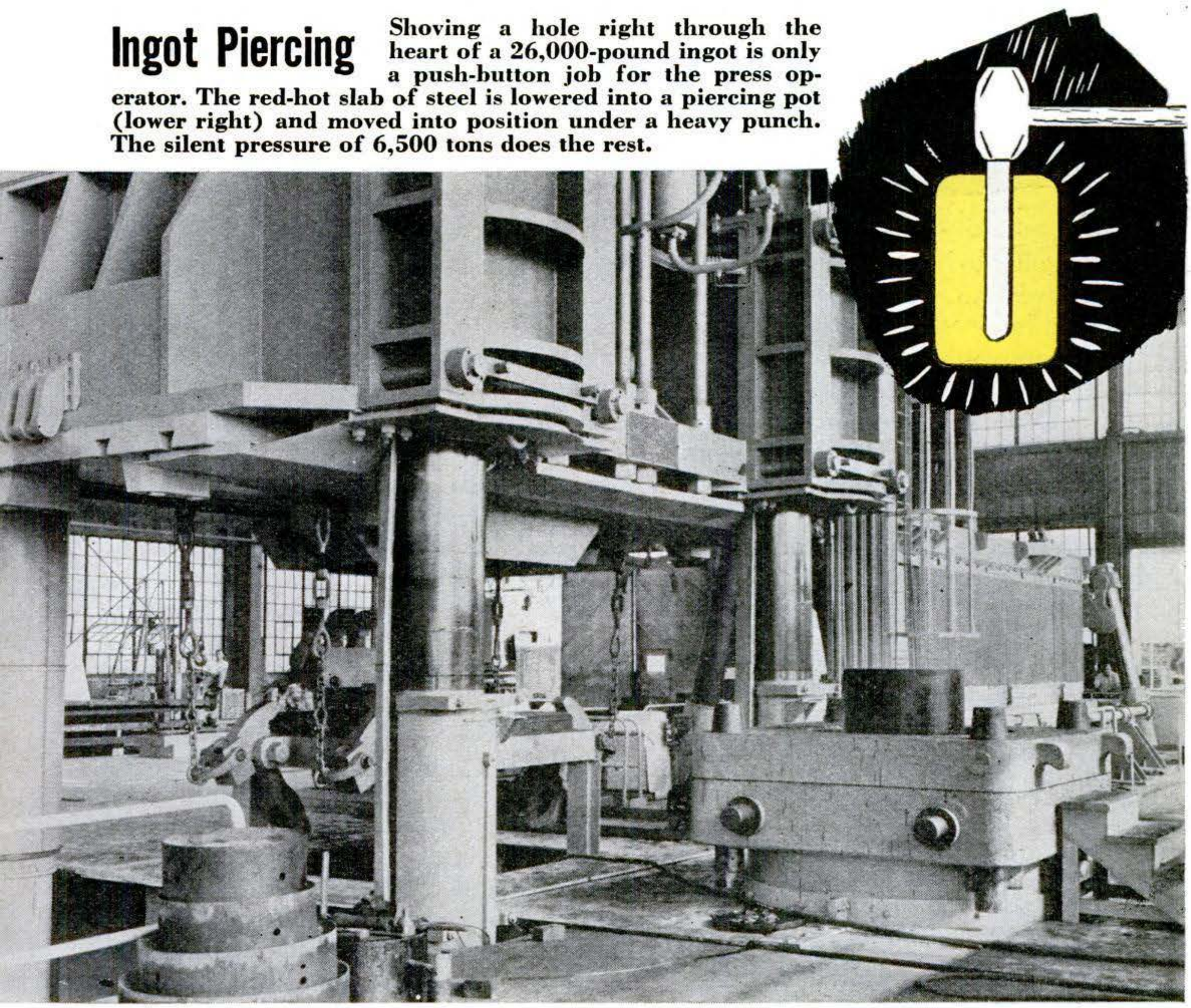
"We're just in time," Tom said. "Here comes the mule."

A little car crawled up to the door of the furnace, latched onto the movable platform which formed the floor, and hauled it out into the open shop. A hundred feet above us a traveling crane eased its claws into position, snatched up the glowing ingot and trundled it down the hall to the side of the hydraulic press.

Directly below stood a sort of steel caldron—the "piercing pot."

"That," he said, "is the cupped hand

Ingot Piercing **Shoving a hole right through the heart of a 26,000-pound ingot is only a push-button job for the press operator. The red-hot slab of steel is lowered into a piercing pot (lower right) and moved into position under a heavy punch. The silent pressure of 6,500 tons does the rest.**



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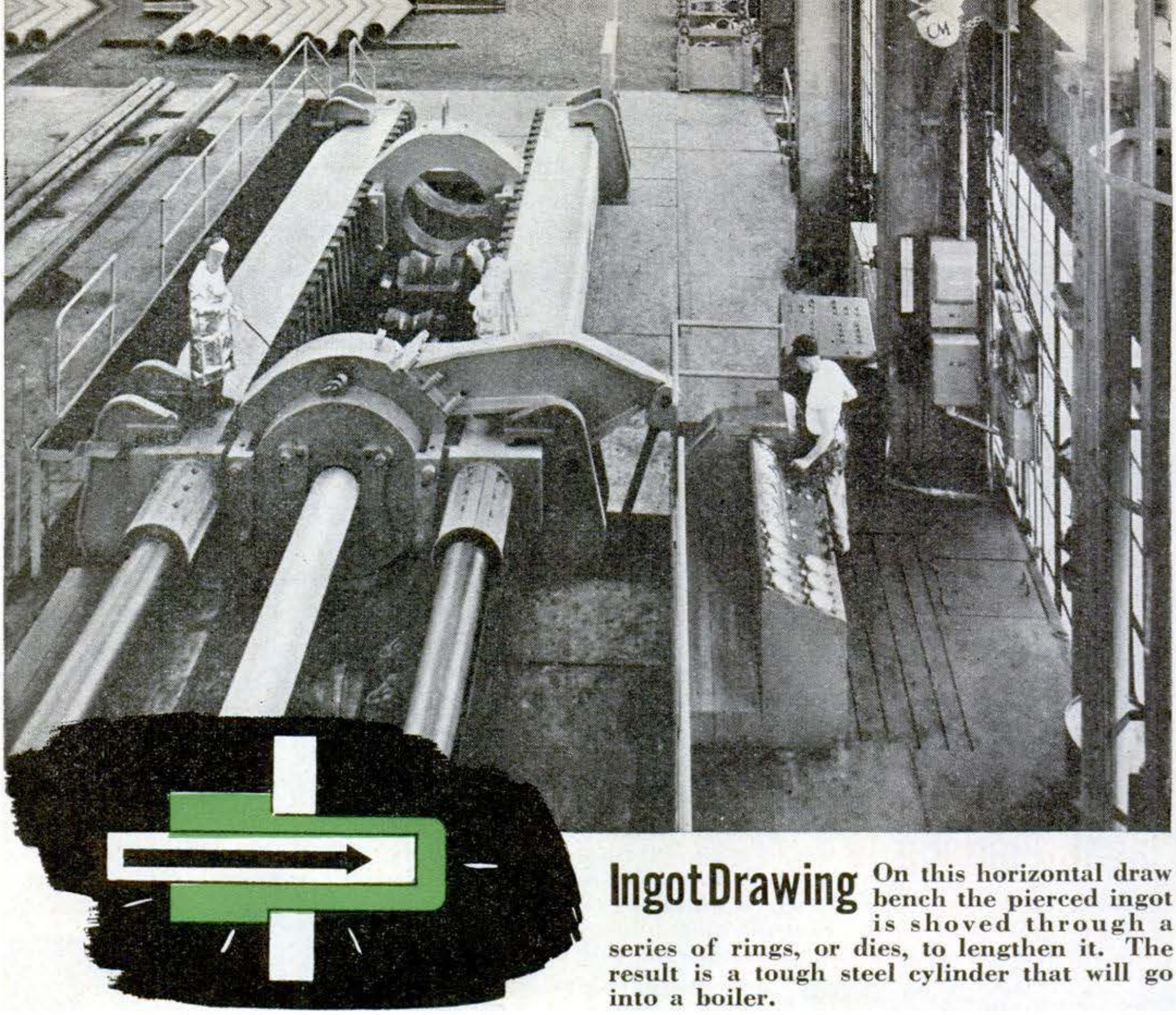

Ingot Drawing On this horizontal draw bench the pierced ingot is shoved through a series of rings, or dies, to lengthen it. The result is a tough steel cylinder that will go into a boiler.

which is going to hold the ingot while the press shoves an 18-inch punch down through it. Such an operation would have seemed impossible 10 years ago. We've always had to drill the ingots out, and that was a long, slow process."

What happened in the next three minutes had to be seen to be believed. The ingot, now cooled to a cherry red, disappeared in the hollow cylinder. The crane cast free and a gloved hand waved "All clear."

Fireworks Disappointing

From somewhere deep beneath the floor came a hollow rumble, and the piercing pot moved into position below the center of the press. Another wave and the lower platen began its downward slide in ghostly silence, driven by three giant cylinders with a combined pressing force of 6,500 tons. The vertical punch beneath it slid into that steel ingot like a pencil probing a roll of butter.

There was only one display of fireworks. It happened when the punch came clear of the ingot at the end of the return stroke, releasing a charge of gases trapped in the hollowed metal. A cloud of ugly brown smoke wreathed up toward the skylights, spread into a dozen ribbons, and quickly disappeared.

A touch of a lever and the piercing pot crawled back to its station under the crane. There was no need to fish for the new forging. It rose half out of the cylinder, shoved from below by an ejector plate, and the crane picked it up and held it aloft for inspection.

Even Tom Shank seemed satisfied. The mass of hot metal displaced by the punch had not been dissipated. It had been forced to spread out into the form of the cylinder lining, and now resembled a hollow projectile.

I had just seen the first step in making a boiler header, a slender drum into

[*Continued on page 242*]

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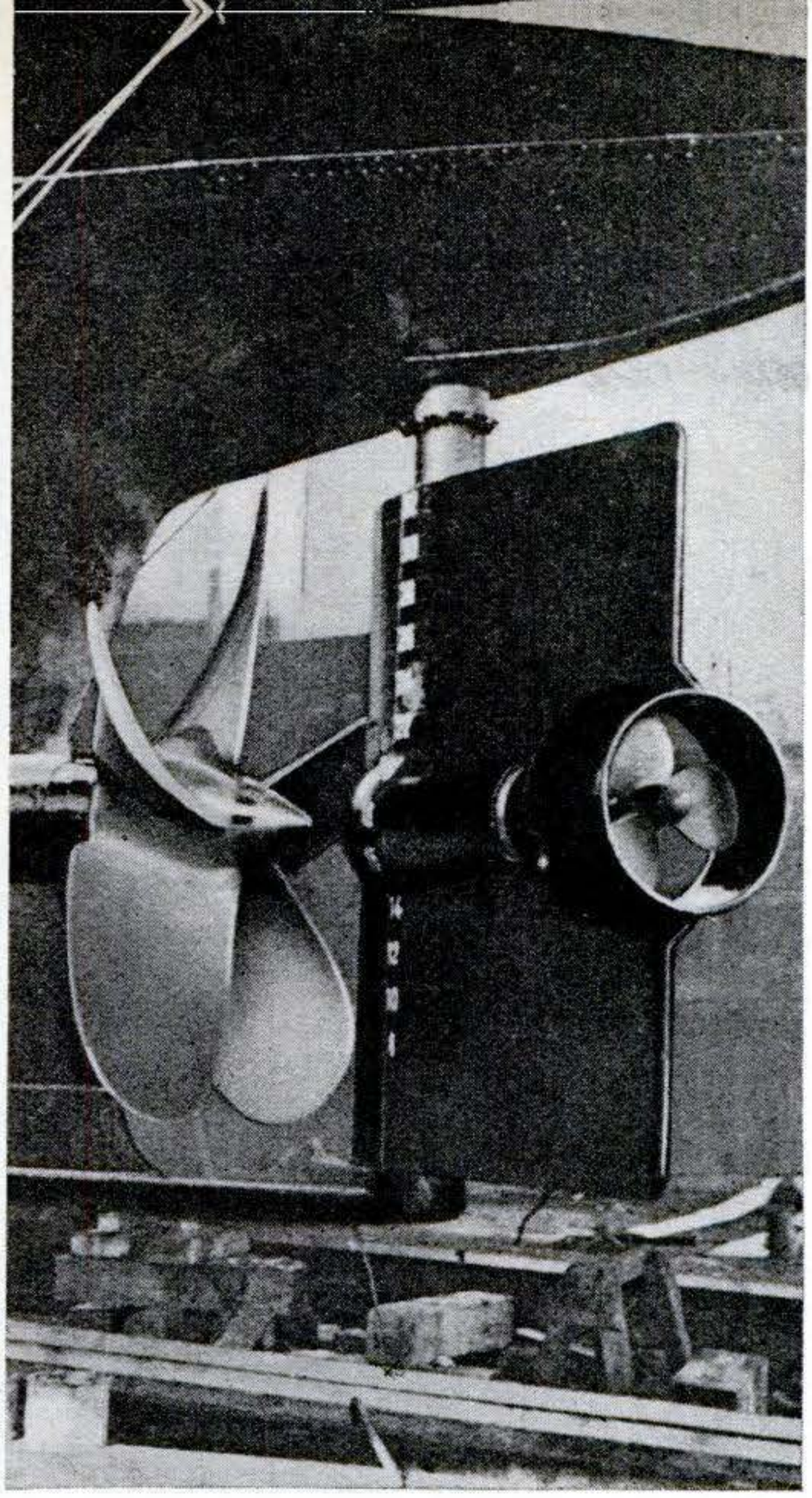
NEW IDEAS FROM GERMANY



Propeller Built into Rudder

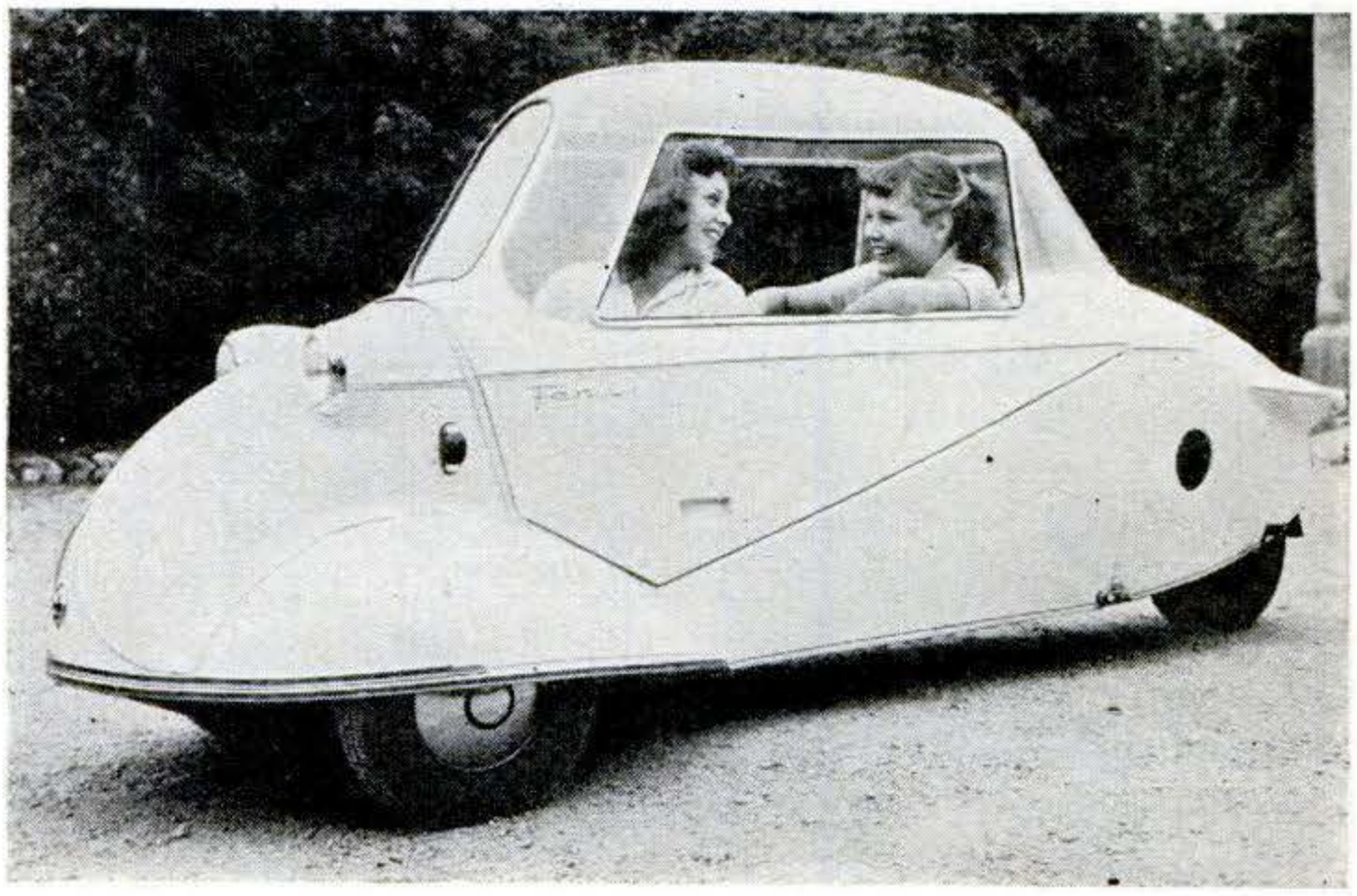
AN AUXILIARY propeller in its rudder enables the ship above to maneuver without a tug in harbors or canals. When the rudder is turned, the propeller pushes the stern around. An electric motor, mounted on the rudder and using current from its own shipboard generator, drives the extra screw.

Automatic Saw Cuts Off Pipe

FASTENED in place upon a pipe to be cut off, a new automatic electric saw travels around it—making either a straight cut or a V cut, as desired. After you have made a small entering slit with the circular saw blade (above) the machine does the rest by itself.

You Lift Top to Enter Tiny Car

TO GET in or out of this tiny streamline "cabin scooter," recently demonstrated at Frankfurt, you raise its hinged top. In motorcycle style, two seats for the driver and a passenger are arranged in tandem. Lightweight and agreeably economical of fuel, the diminutive machine has been clocked at a speed of more than 60 miles an hour.



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How TOY INVENTORS Sell Their Ideas

The toys that are child's play are men's work. Today, they're a billion-dollar business inwhich fortunes are made and lost on a single idea. Here's how.

By Mel Helitzer
Director, Toy Guidance Council

WALKING DOLL, which takes steps by itself when led by the hand, was an instant success—and an instant headache to at least three manufacturers all claiming to be the original producers. Piracy, always a problem, is partially—but never fully—avoided by patents.

BEN GELARDIN, who worked for a battery manufacturer, wanted to make some extra money. He wondered if he could make a toy that would use dry cells. His wife, busy with their six-month old son, suggested a rattle that would light up when tilted. So Gelardin made a working model and hopefully set out to sell his idea.

That took two years. But now the Jolly Blinker Co. of The Bronx, N. Y., is selling 300,000 blinking rattles a year. Inventing a toy and selling the idea, Gelardin learned, is like writing a book: 10 percent inspiration and 90 percent perspiration.

As a director of Toy Guidance Council in New York, I see dozens of toy inventors every week. We discourage such interviews because the Council's function is to help parents, not designers. But even so we examine ideas for toys that run the gamut from simple games to dolls that eat, grow and have children.

Nearly always, the inventor firmly believes that his toy will become a national fad, but is averse to spending the time that it takes to sell an idea.

An Akron, Ohio, inventor once perfected a doll that could smoke cigarettes. Manufacturers cold-shouldered his idea because they correctly believed that

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mothers would not want children to play with cigarettes—and the inventor forgot about the whole thing.

Someone else, working on the same principle, later designed a teddy bear that could blow up rubber balloons and soap bubbles. This was an instant success, and brought a handsome annuity to its industrious inventor.

Fortunes are made and lost on toys. But toys are no longer child's play. They're men's work.

The toy industry today is a billion-dollar business that eats up good ideas as fast as professional inventors can turn them out. But the risk is so great—it costs as much as $25,000 to make a single plastic mold—that manufacturers are more particular than ever before.

Many Tests to Pass

Your toy must pass basic tests for safety and durability. It must contribute to a child's mental, social, physical or vocational development. It must be marketed with certain age ranges in mind. Its purpose, material, price, packaging and emotional appeal must be perfect.

Would you still like to try to invent one?

A successful plaything usually must be a copy of something that adults use.

RATTLE THAT LIGHTS UP when pushed took its designer two years to market. Now selling at the rate of 300,000 a year, it is making him and his wife (she suggested it) a fortune.

Children want to "act grown-up." They enjoy, most of all, toys that permit them to imagine that they are fire chiefs, Hopalong Cassidys or mothers. A toy may be an excellent means of teaching children spelling, colors, painting or how to build a house, but it will be quickly

[Continued on page 244]

REALISM is the watchword of many of today's new toys, like this authentic copy of a Blue Diamond dump truck. Accurate down to the last detail, it has a simulated hydraulic lift that actually raises the body for dumping, a self-operating tail gate and treaded rubber tires. Such toys not only amuse but help teach children much about the adult world around them. For a selection of some of this year's best new toys, turn the page.

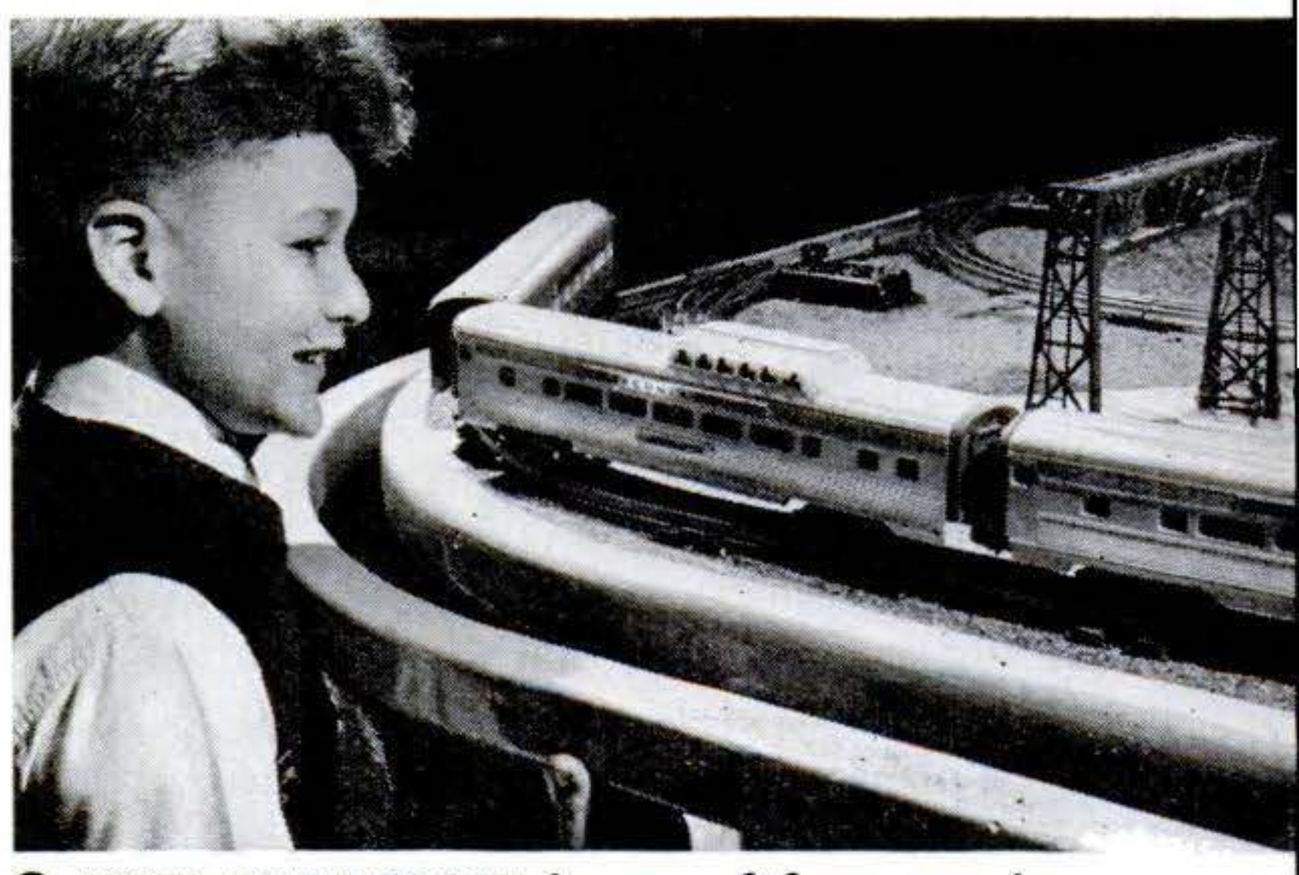
Expert Picks Outstanding New Toys

1. FIRE FIGHTER, accurate reproduction of real pumper, squirts a stream of water 35 feet when pump is pushed. All-metal truck has ladder, rubber tires. Price: about $16.

Here are 11 of the 1952 toys that will tempt children—and parents—this Christmas.

HERE'S a preview of a few of the playthings that you will see in toy shops when those hectic Christmas-shopping days roll around next month.

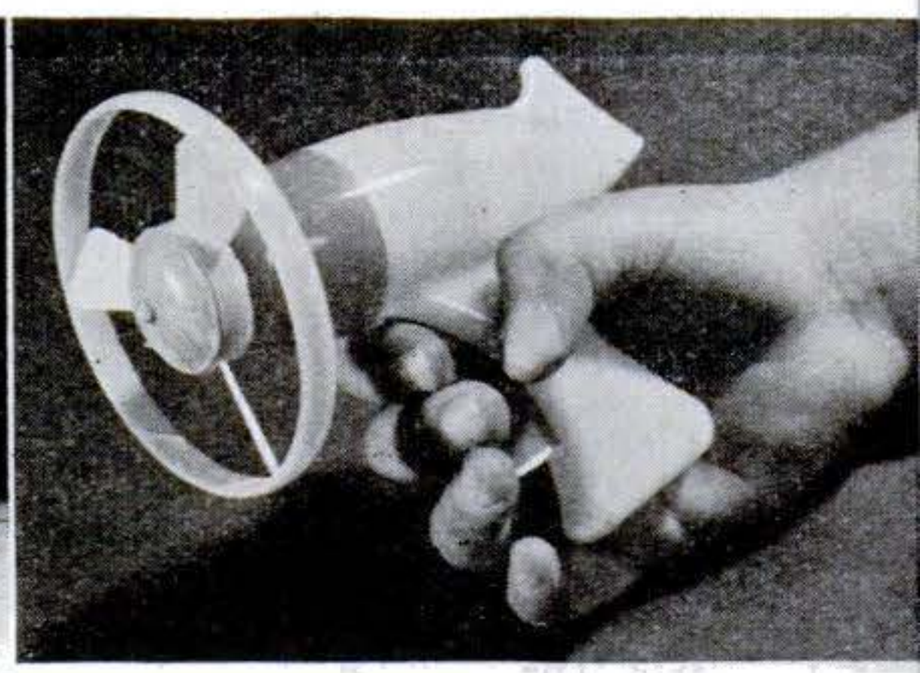
Selected by Mel Helitzer, author of the story on the preceding pages, from more than 500 toys displayed by the Toy Guidance Council, they are considered some of the best of this year's crop. Many of them copy some phase of adult life—the kind of toy that has a high popularity rating with Junior and his sister.



3. VISTA-DOME COACH is one of four cars in this replica of streamlined California Zephyr train. The complete O-gauge model train sells for $89.50; one car costs about $10.

6. CONSTRUCTION TRUCK will dig, load, bulldoze and haul all types of material. A scale model of the big earth-moving Payloader truck, it is 18 inches long. Its loading bucket can be raised and lowered by a crank and dumped by releasing a catch. Price: about $8.

7. LOCOMOTIVE chugs and puffs bubbles out of stack as it is pulled along. It comes complete with bubble solution, and a special container inside prevents the liquid from spilling if engine should tip. The plastic pull toy is more than a foot long. Price: $3.



8. "FLYING SAUCER" GUN sends plastic disks sailing 80 feet through the air. The three-bladed disks can also be shot directly down on the ground and will spin like a top. They are wound up on the gun's nose and released by pulling a trigger. Price: $1.

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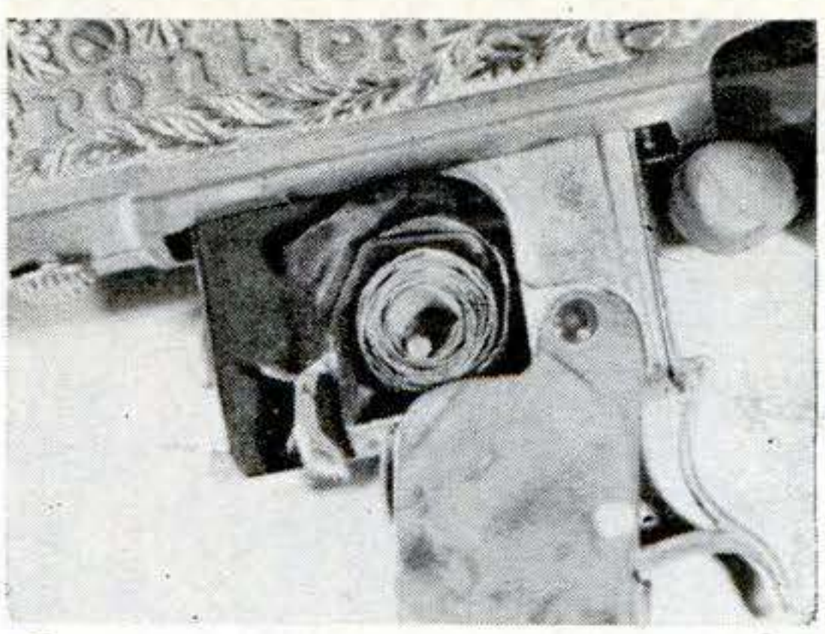
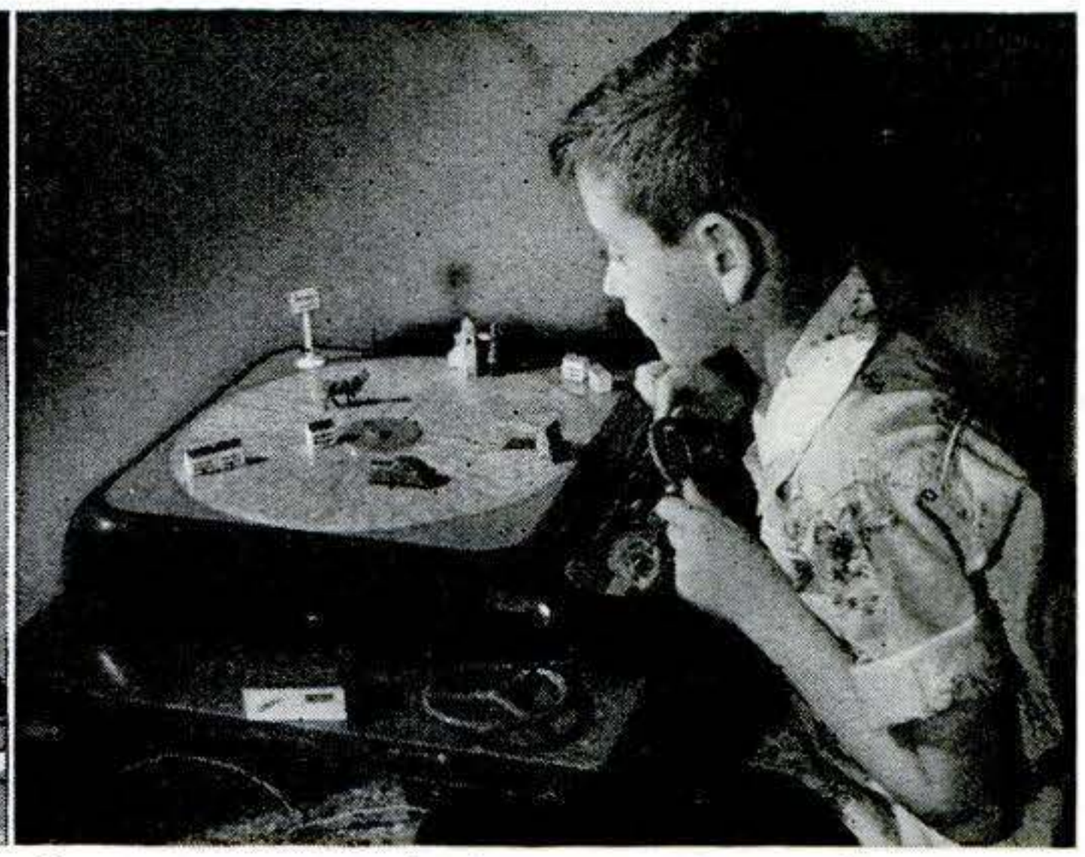
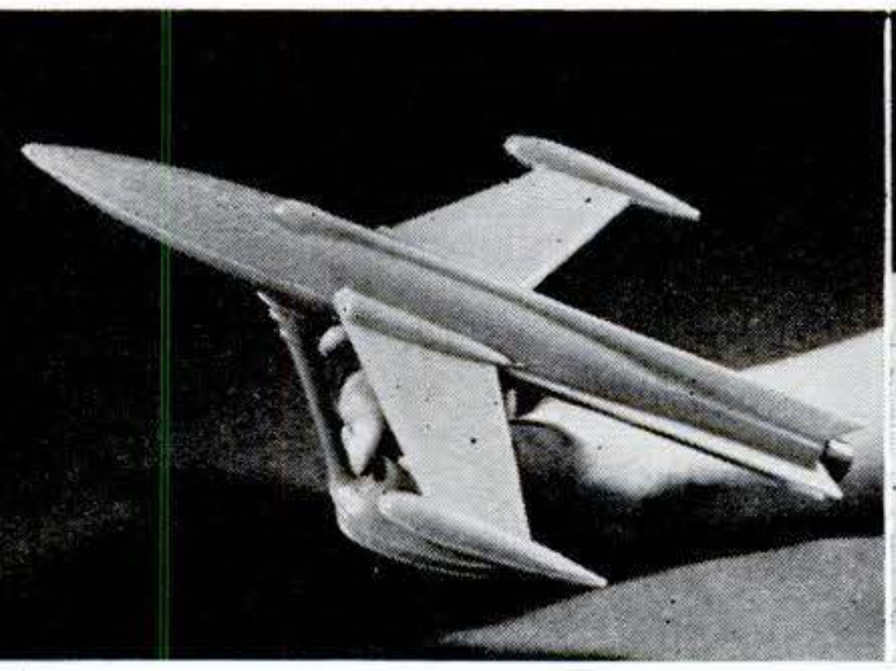


2. CAP-SHOOTING RIFLE, made of plastic and metal, is nearly three feet long. It loads a full roll of repeating caps and has a cap-ejection chamber (above) that snaps open when a button near the trigger is pressed. A sight and trigger guard are mounted on gun. Price: $4.

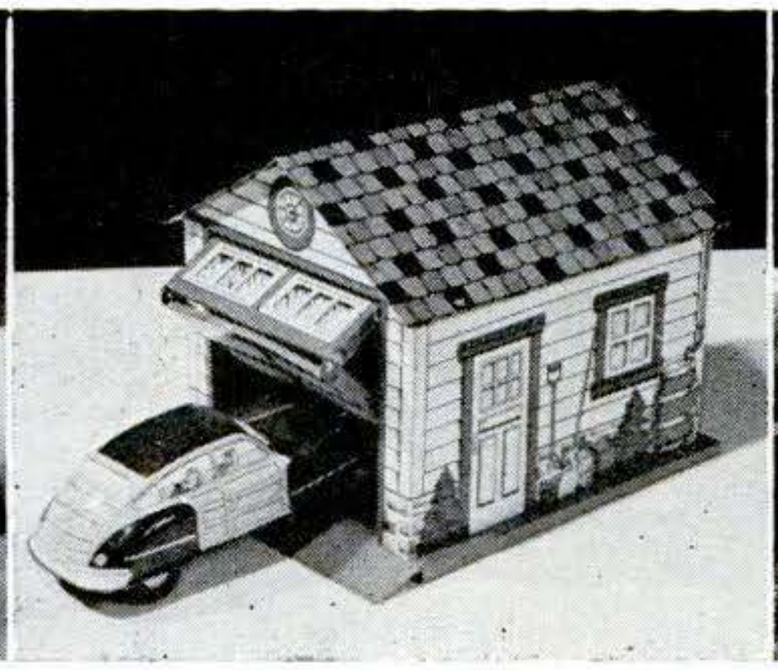
4. SWITCHBOARD, powered by batteries, rings, buzzes, and has six connection plugs. Two phones come with the set, plus a telephone dial on the switchboard. Price: about $9.



5. TINY AUTO whisks around circular course as Junior controls its speed and direction from dashboard. Magnetic car follows a motor-driven magnet underneath. Price: about $20.



9. JET FIGHTER fires six streams of water from underwing "rocket" guns. Streams converge at 15 feet, and entire plane holds water. Price: $1.



10. GARAGE DOOR automatically opens as friction-motor car bumps into it, letting auto roll inside. Metal garage is 9 ins. long, car 7¼. Price: $2.

11. NURSE'S KIT holds 63 pieces, including stethoscope, bandages, forceps, scissors and thermometer in doctor-type satchel. Price: about $2.

Further information on these toys can be obtained from: 1. Chas. Wm. Doepke Mfg. Co., Rossmoyne, Ohio; 2. Hubley Mfg. Co., Lancaster, Pa.; 3. Lionel Corp., 15 E. 26th St., NYC; 4. Kamkap, Inc., 200 Fifth Ave., NYC; 5. German Inventions & Novelties Co., 210 Fifth Ave., NYC.; 6. Ny-Lint Tool and Mfg. Co., Rockford, Ill.; 7. Ideal Toy Corp., 200 Fifth Ave., NYC.; 8. U.S. Plastics Co., Pasadena, Calif.; 9. Kusan, Inc., Nashville, Tenn.; 10. Courtland Mfg. Co., Camden, N.J.; 11. American Metal Specialties Corp., Hatboro, Pa.

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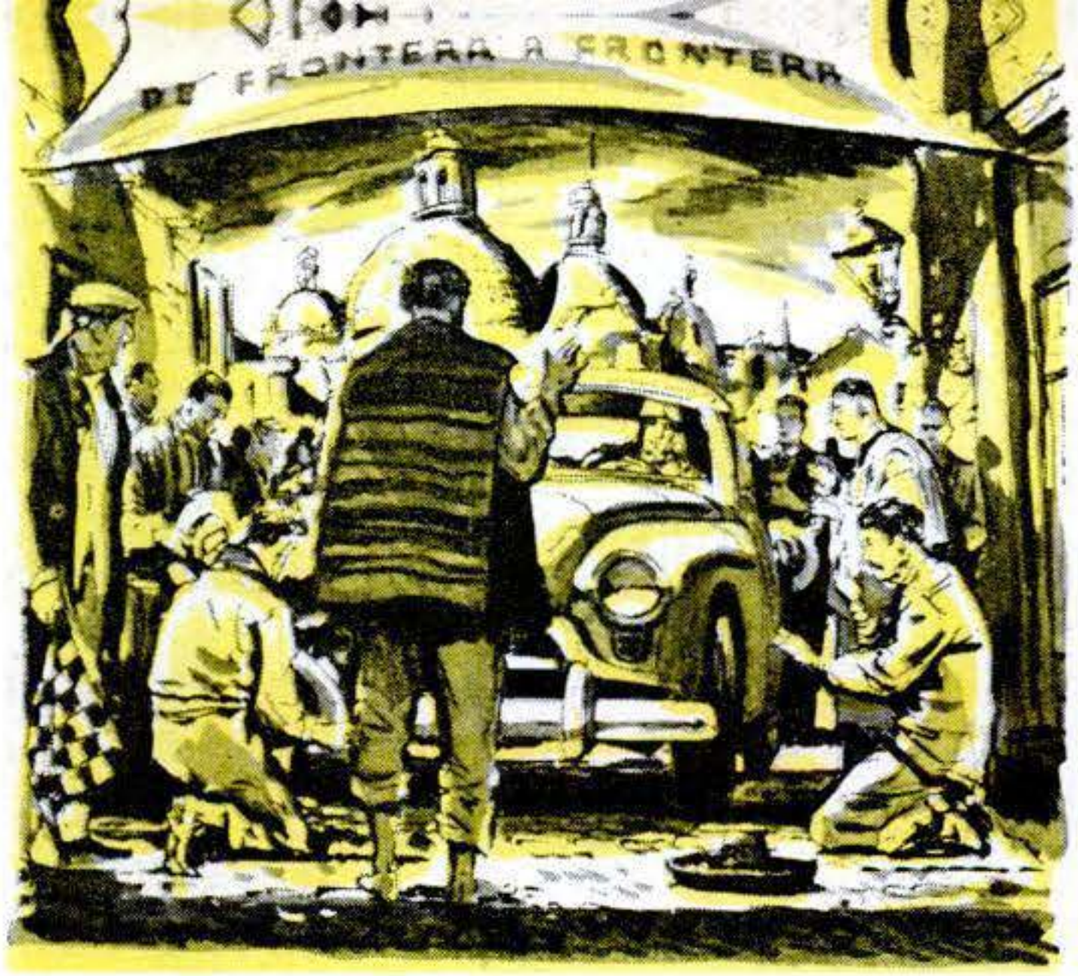
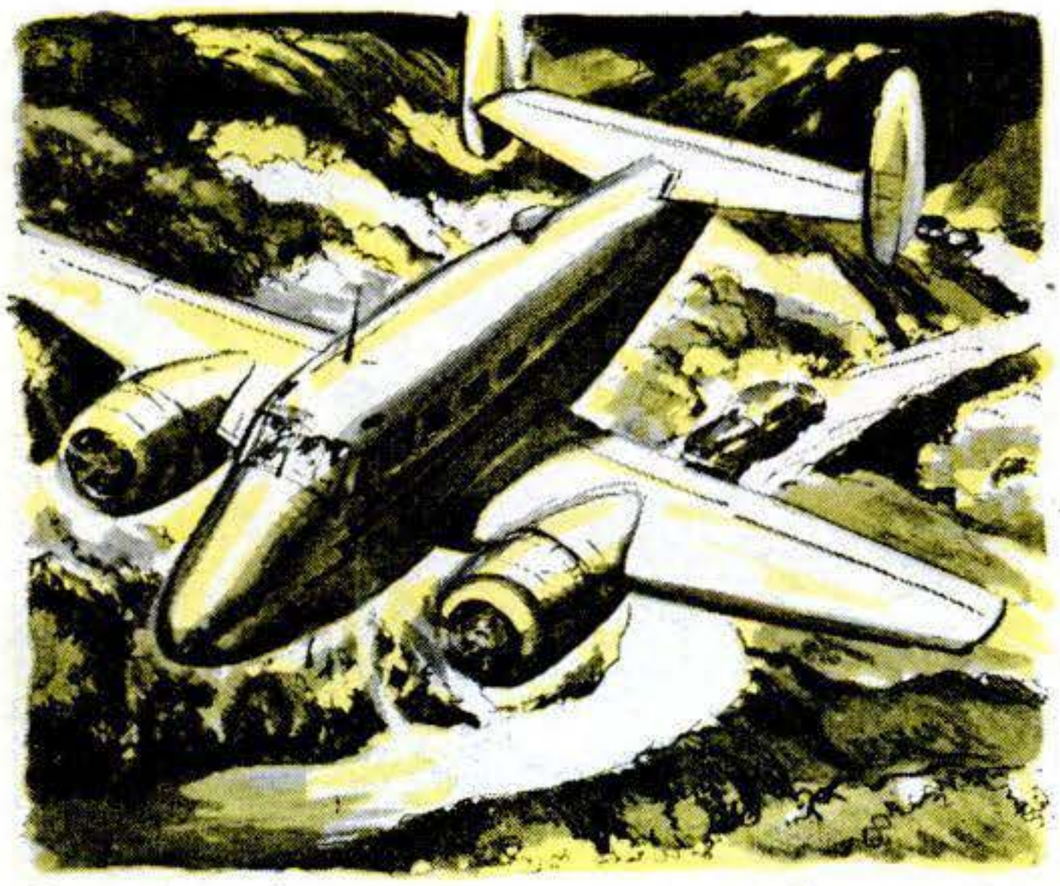
Road Racing's Toughest Test

2,400-mile Mexican speed classic is a grueling ordeal for men and machines.

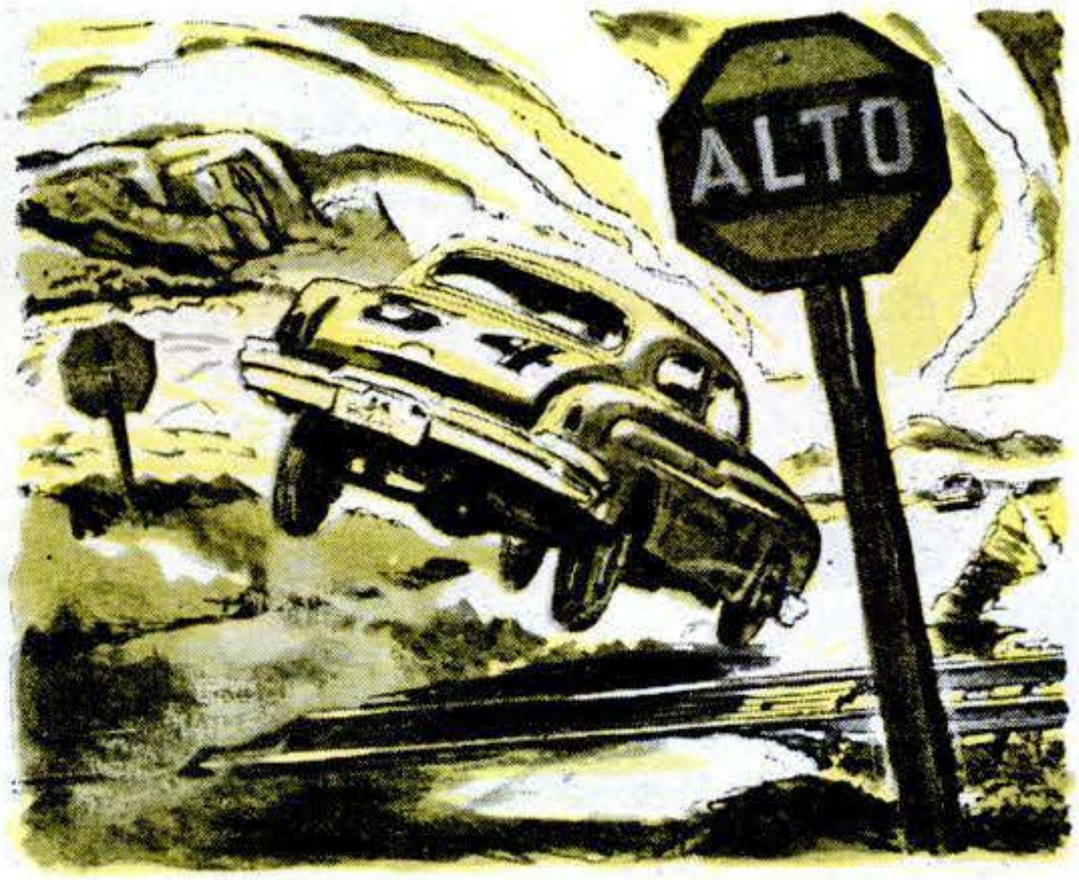
IN THE land of the tortilla and tamale they're running the third annual Mexican Road Race this month—Nov. 19 to 23. Mexico's mountain passes will echo to the thunder of more than 100 high-powered cars—stock and souped-up specials—over a breakneck course from Guatemala north to Nogales, Ariz. Sketches, based on incidents in the first two races, show what to expect.



ONLOOKERS OFFER THEIR BLESSING as drivers get set to take off at 60-second intervals in bid for fame and fortune—or sudden death.



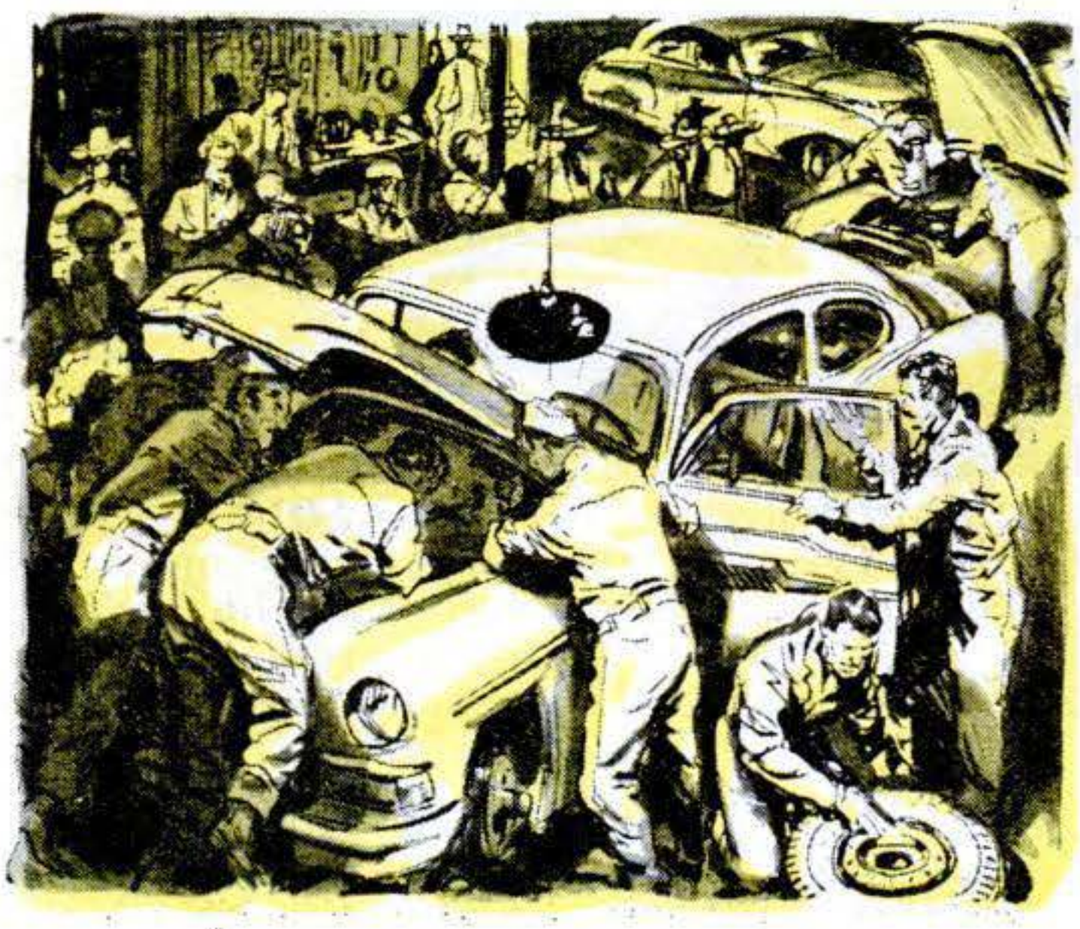
2 ANYTHING GOES · · race for prizes totaling more than $65,000. A contestant may even use a plane and two-way radio as a "seeing-eye" guide on tortuous mountain roads.



3 DEATH IS A CONSTANT PASSENGER. In 1950, Ray Crawford's Lincoln leaped eight feet when he hit rail crossing at 110 m.p.h. He escaped injury. But three were killed in '51.

4 HOSPITAL UNITS are placed at strategic points along route. Though new tires are used daily, blowouts cause most accidents.

5 NOBODY GETS MUCH SLEEP during five-day marathon. At each night's stop, mechanics swarm over cars for painstaking checkup.



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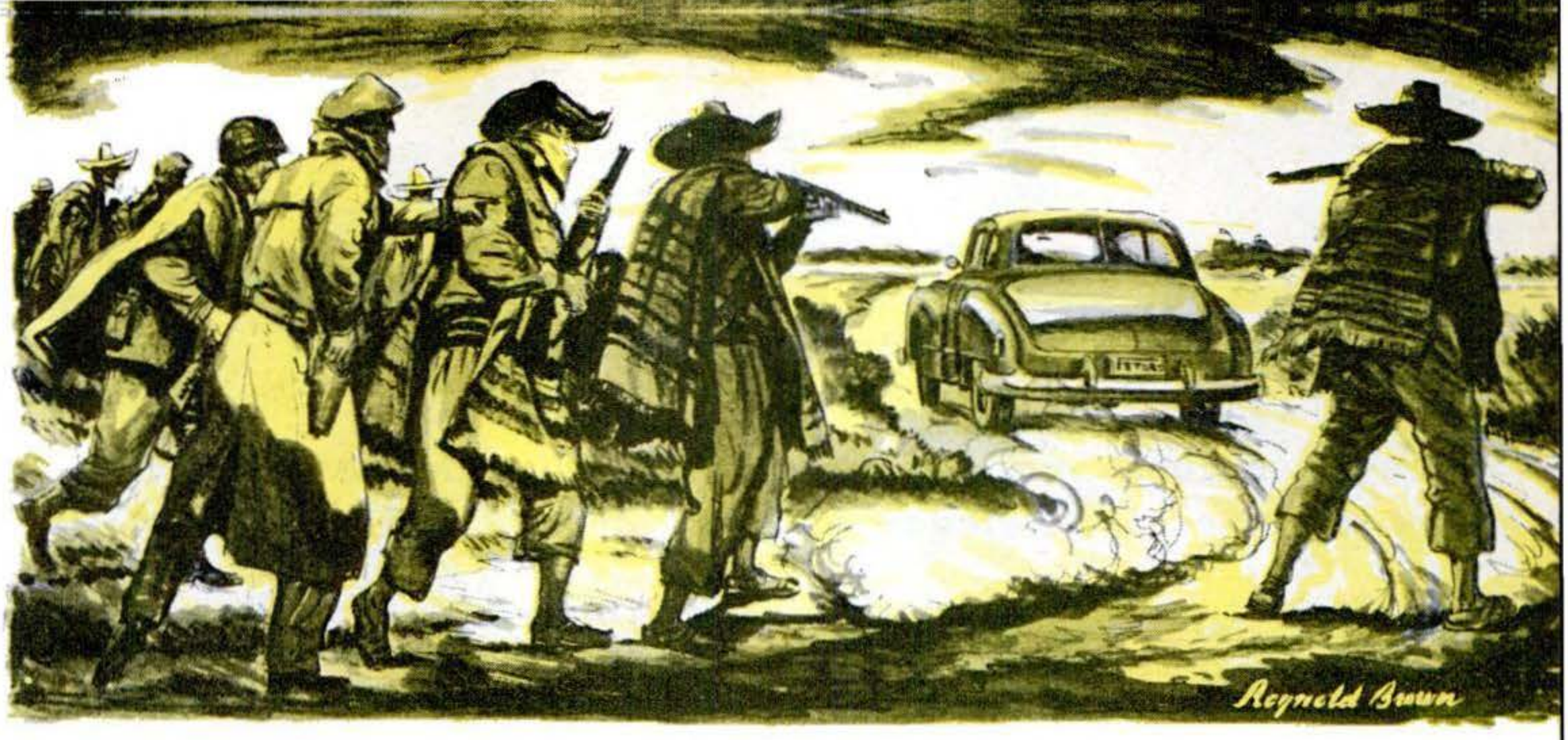


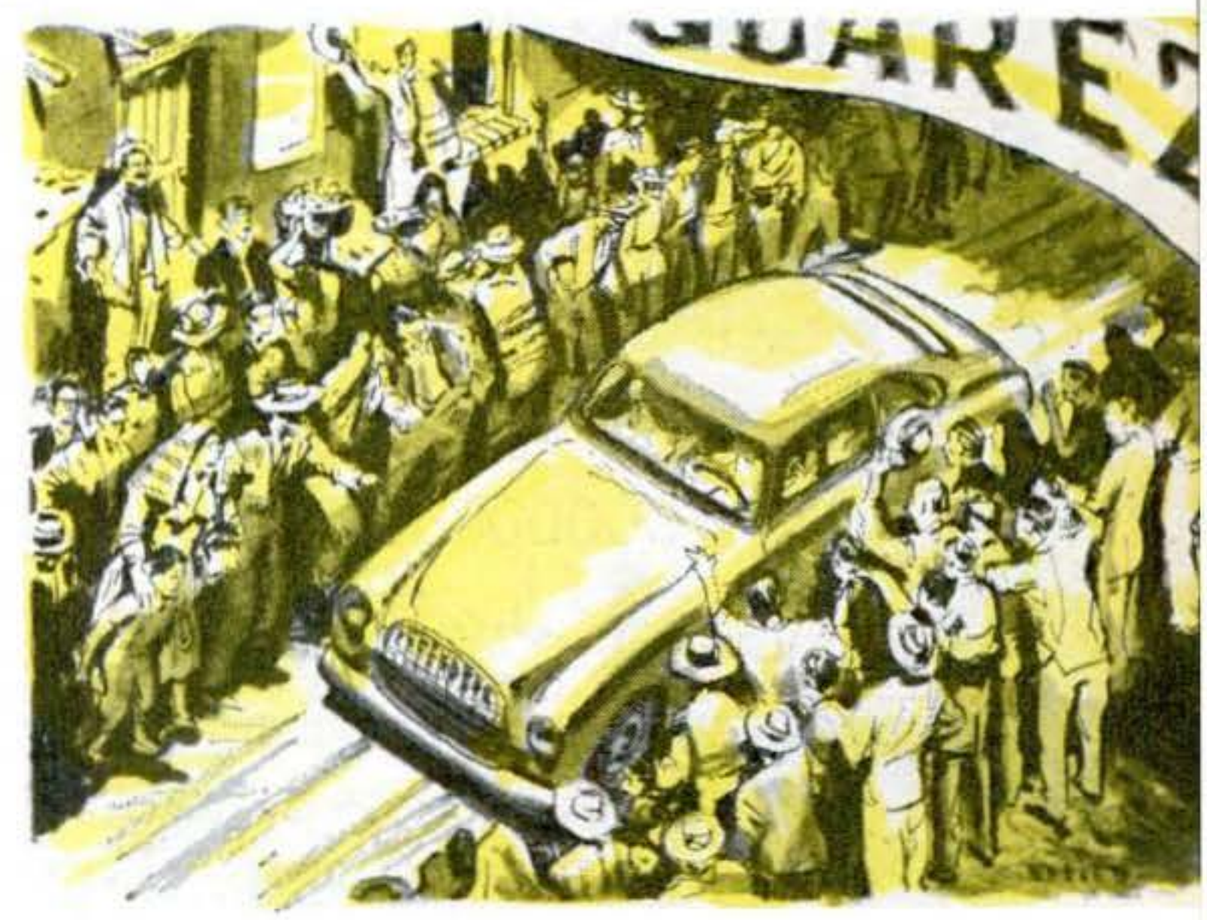
6 ROADS ARE CLOSED to public from three A.M. until the last race car has gone by on that day's run. Last year, one tourist mistook guards, with faces masked against the cold, for highwaymen—and sped past. He was forced to halt when the guards opened fire.

7 OFFICERS MEAN BUSINESS when they check credentials. Photographer, wearing "Press" armband, faces automatic while his pass is examined at one of frequent check points.

8 OUT OF 105 STARTERS last year, 35 suffered accidents the first day. High winds, tire failure and too fast cornering carried cars off road. One rolled over twice, kept going.

9 GOOD SPORTSMANSHIP PREVAILS, for every man's life is at stake. Passing another car, observer signals that rear tire looks bad.

10 CHEERING CROWDS ENGULF WINNER at Juarez, 1951 race terminus. More people view contest than any other sports event.



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How to Spot Phony Money

The green-goods merchants are still shoving the queer, so here are some Secret Service tips on how to tell it from the real McCoy.

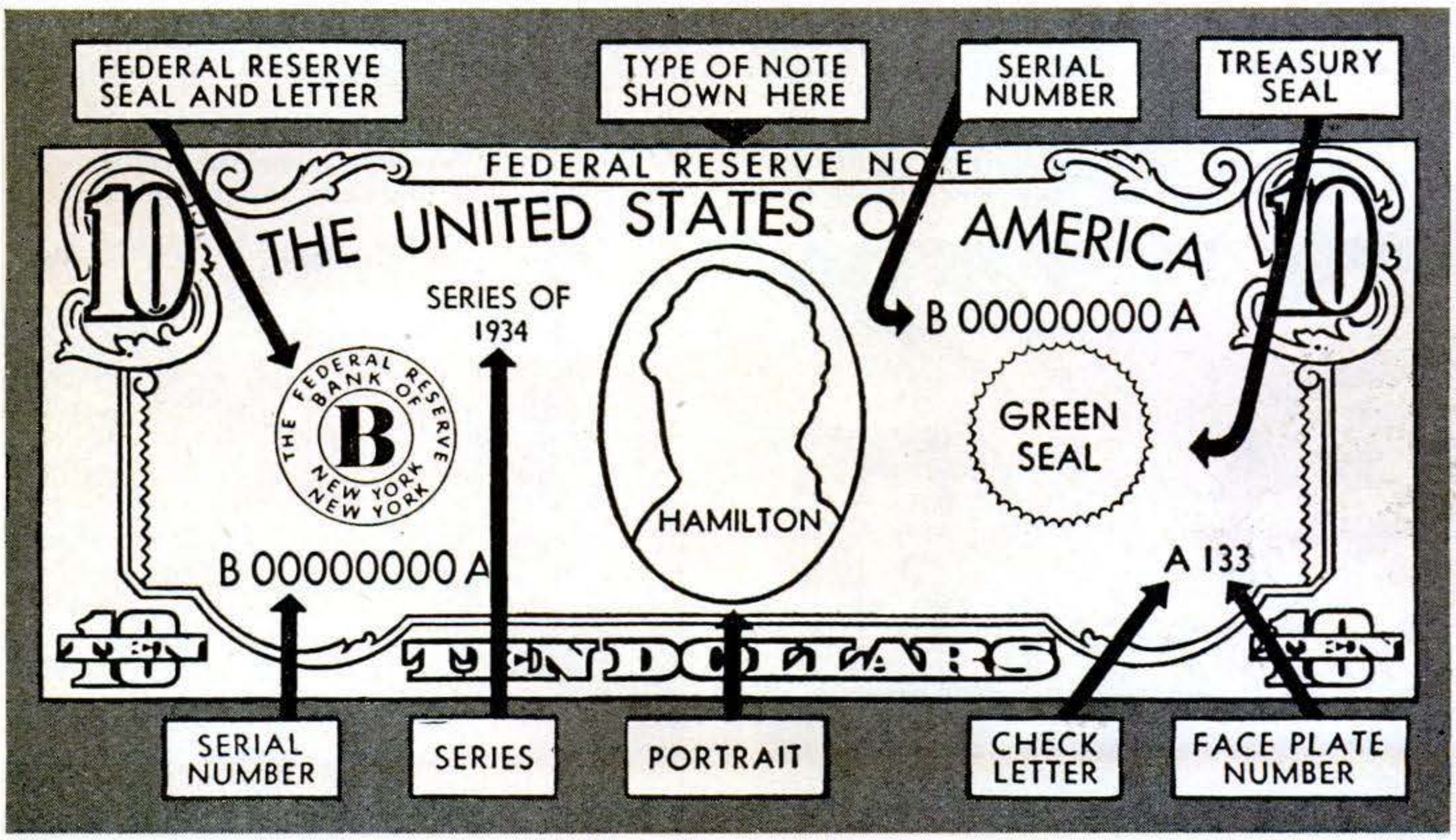
TREASURY SEAL sometimes gives away counterfeits. Note uneven, broken-off, saw-tooth points around phony seal (above left), compared to real thing (above right).

WHEN Kublai Khan printed the first paper money 700 years ago, he beheaded counterfeiters. Penalties are still severe, but crooks keep on trying to make their own money. Here are timely hints on how to avoid getting stuck with phony bills during the holiday shopping rush.

It is essential to be thoroughly familiar with real money. For example, can you name the portraits on U. S. bills? (The answer is at the bottom of the opposite page.) Counterfeiters sometimes raise the value of genuine bills. Don't worry if ink comes off when you rub a bill on paper. Bad engraving is the best tip-off to a phony.

Military experts warn that counterfeit money can be a deadly weapon. Smuggled in or dropped from aircraft, it would zoom prices, throw the nation into confusion.

DETAILS OF BILL are all vital in spotting a fake. Federal Reserve notes have green seal and numbers; U.S. notes, red seal and numbers; silver certificates, blue seal and numbers.



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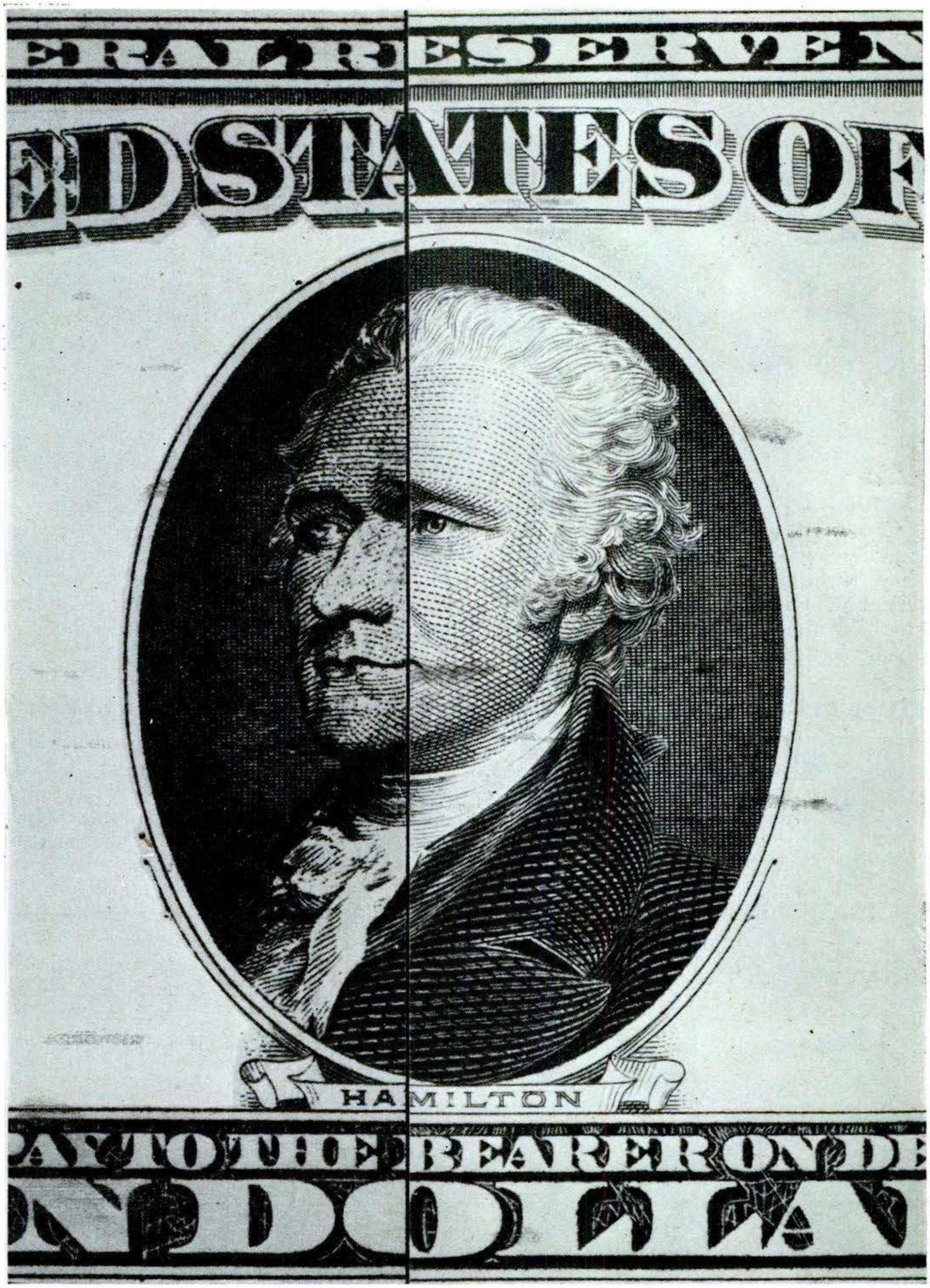

CLOSE-UP OF PORTRAIT HEAD on $10 bill shows difference between crude engraving on counterfeit (above left) and skilled work on the real thing (above right). Creasing a suspected bill through the portrait and matching it with the opposite half of the portrait on a genuine bill is a good way to check. Irregular or broken lines; dull, smudgy or unnaturally white appearance; or dark background are all tip-offs of bad bills. Hamilton (above) is found on the $10 bill. Other portraits are: $1—Washington, $2—Jefferson, $5—Lincoln, $20—Jackson, $50—Grant, $100—Franklin, $500—McKinley.

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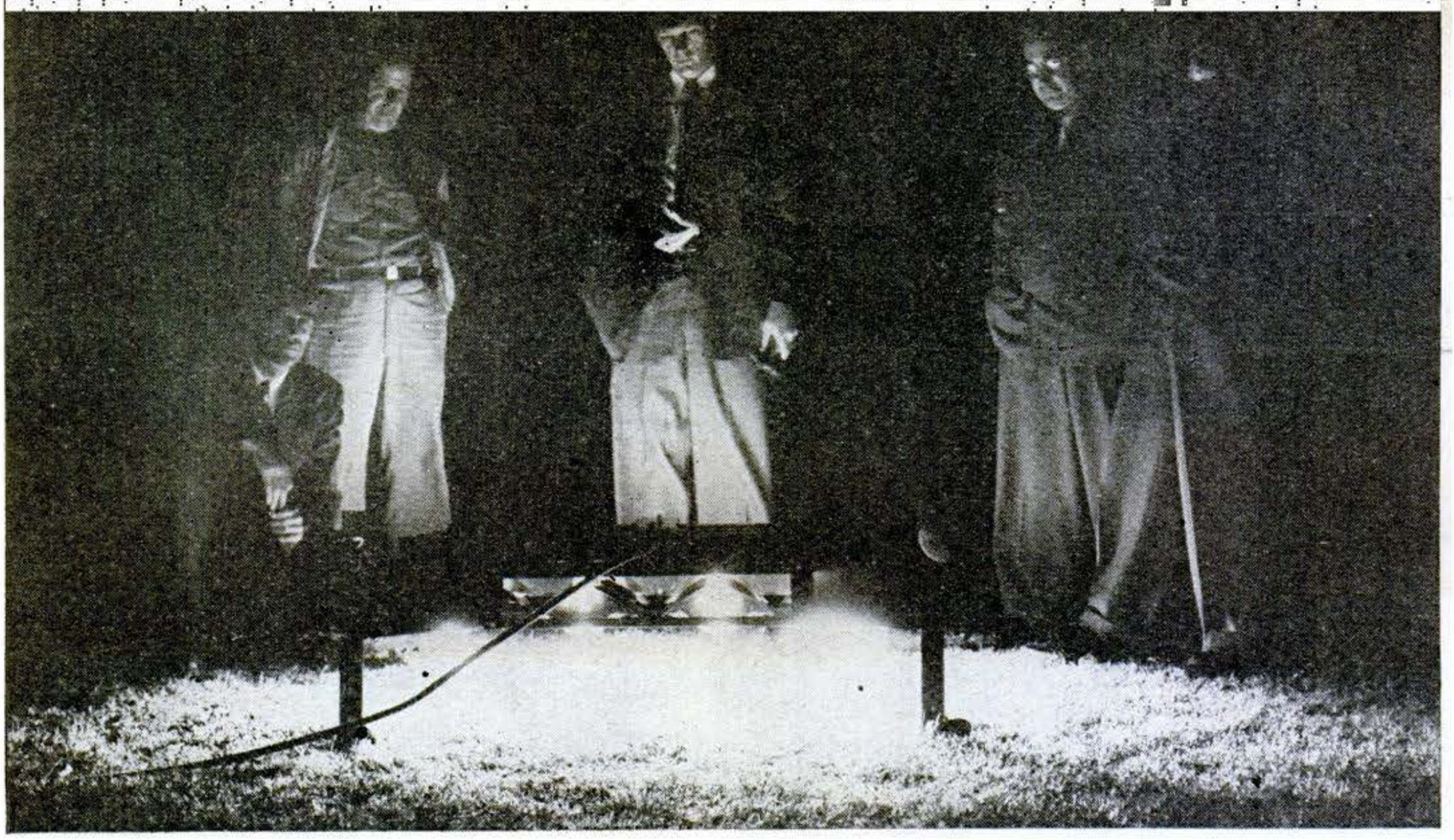
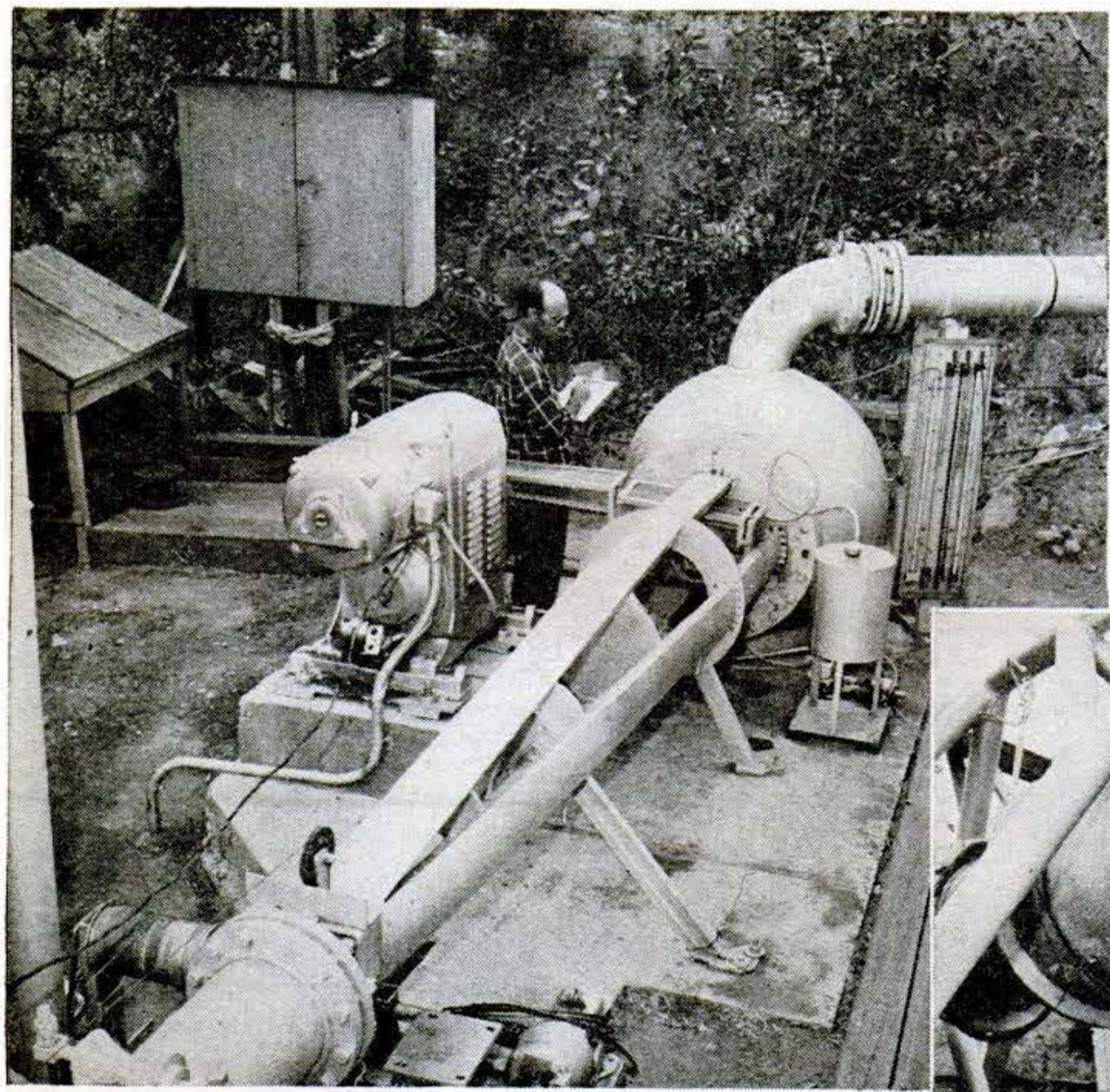


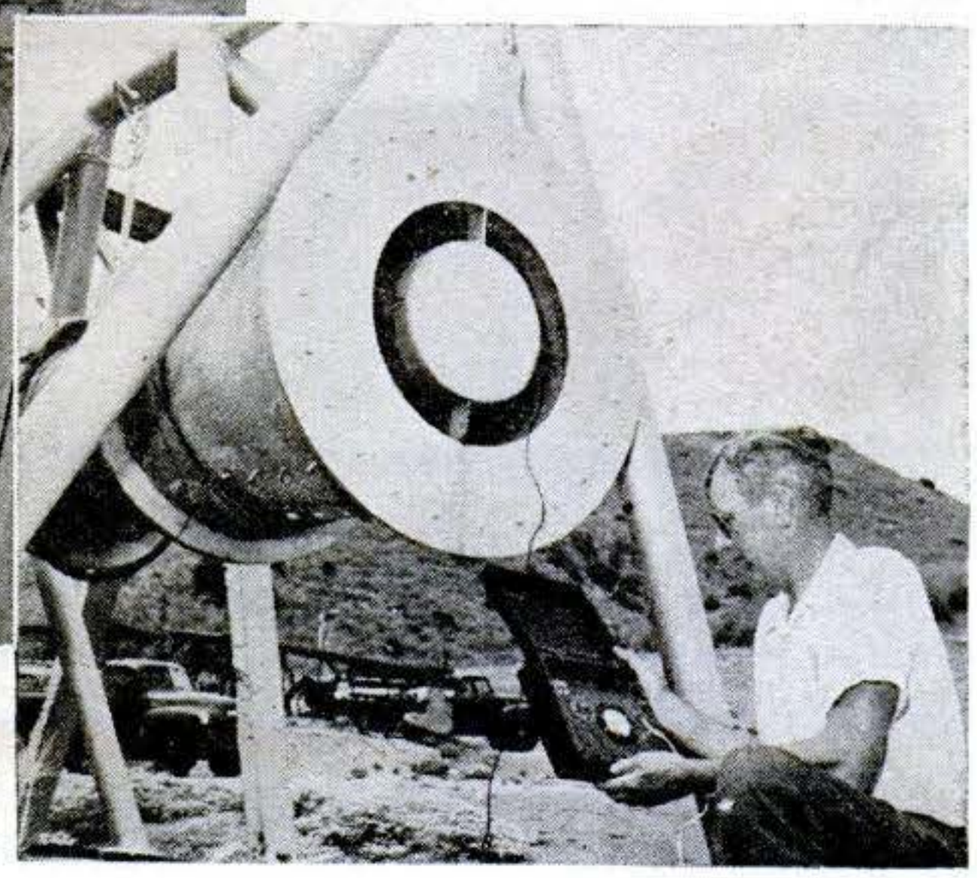
Lamps Dry a Football Field

FOOTBALL games need not be played on a muddy field—not even if many days of rain have waterlogged it, according to General Electric lighting experts. Their answer is to bake the field with heat lamps. Two banks of sixteen 500-watt lamps, moved every 40 minutes, dry 30 square feet at a time. The lamps are mounted on four legs equipped with skid shoes. In a successful trial of the plan at the University of California's Memorial Stadium, a 16-hour application of the lamps yielded a playable field.

Tube in Canyon Bottles Up Scream of Most Powerful Siren in World



TO HELP engineers learn how to quiet jet engines, the world's most powerful siren is screaming into a 90-foot-long pipe in a California canyon. The sound waves, as loud as 2,500,000 voices, differ in behavior from familiar ones. Instruments analyze them in tests made for the Navy by the Soundrive Engine Co., Los Angeles. A muffler tames emerging noise.



SIREN at left of compressed-air-supply sphere (above) delivers blast through duct to end of 90-foot pipe in foreground. Muffler at pipe's exit end (right) has glass-fiber lining.

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HELICOPTERS GUIDE SHIPS through Baffin Bay ice to supply Thule, world's first polar crossroads. Planes bring in supplies during nine months of year that Thule is ice-locked.

Where Our Bombers Nest in the Icebergs

A SOLDIER brand-new on a certain U. S. Air Force base frantically called the fire department the other day.

"Hey!" he yelled. "A truck just went by and it's on fire!"

"Relax," replied the fire department. "It's supposed to be on fire."

The truck had a fire aboard to keep its cargo warm. The cargo was water—and the temperature was below zero. Fires burn regularly in trucks at Thule, halfway between the Arctic Circle and the North Pole.

Existence of a $263,000,000 bomber base at Thule, a scant dozen miles from Greenland's icecap and 900 miles from the Pole, has just been revealed by the Department of Defense, though it has been in operation for 13 months.

It's a weird place. The barracks build-

WINTER FORCES AIR-LIFT of equipment for new bomber-interceptor airport, including such items as ambulances. Automobiles have primers operated from driver's seat for cold starts.

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A FAIR-SIZED CITY NOW, built by Army's Corps of Engineers on what was Arctic waste supporting a few Eskimos, Thule has a complete road system. At peak traffic hours a cop directs cars at main intersection known as Times Square. In winter, car and truck radiators are filled entirely with antifreeze. Tire treads freeze solid and chip off.

ings have outside doors like those that are used on butchers' ice boxes. Metal door knobs are covered with plastic so your hands won't freeze to them if wet. Inside is a sort of temperature lock where people coming in doff their parkas and boots. That's so the snow and ice melting off them won't get the barracks floor wet. You have to go through another door to get to the living quarters.

All the windows are permanently sealed. Fresh air—passed through a steam heat exchanger—is fed in through louvers in the walls. On the sides of the buildings hang strings of big concrete blocks to weight them down against the occasional storm winds that reach 150 miles an hour.

Canned Rations for Storms

When a storm hits, everybody stays put, no matter where he is. Canned emergency rations are stored everywhere for just such contingencies.

The airplane hangars are actually buildings-within-buildings—heated air is ducted between the outer and inner walls to maintain a comfortable temperature inside.

This had to be done for the planes as well as the personnel. Temperatures that drop as low as –60° play hob with hydraulic and electrical systems. If left outside, planes and automobiles get "cold-soaked," and it takes hours to get them running again.

Tourist Cabins Next?

Yet Thule has its virtues. For most of the year the flying weather is wonderful. Planes using its 10,000-foot-long runways climb into air that is crystal-clear and free of bumps. The worst flying is in the summer when the temperature ranges from just below freezing to the low 40s. That causes fog.

Thule may well become the first top-of-the-world commercial, as well as military, airport. Talks are going on now to establish airliner service via Thule from Los Angeles to Scandinavia—at a saving of 1,800 miles over the North Atlantic route.—*Devon Francis.*

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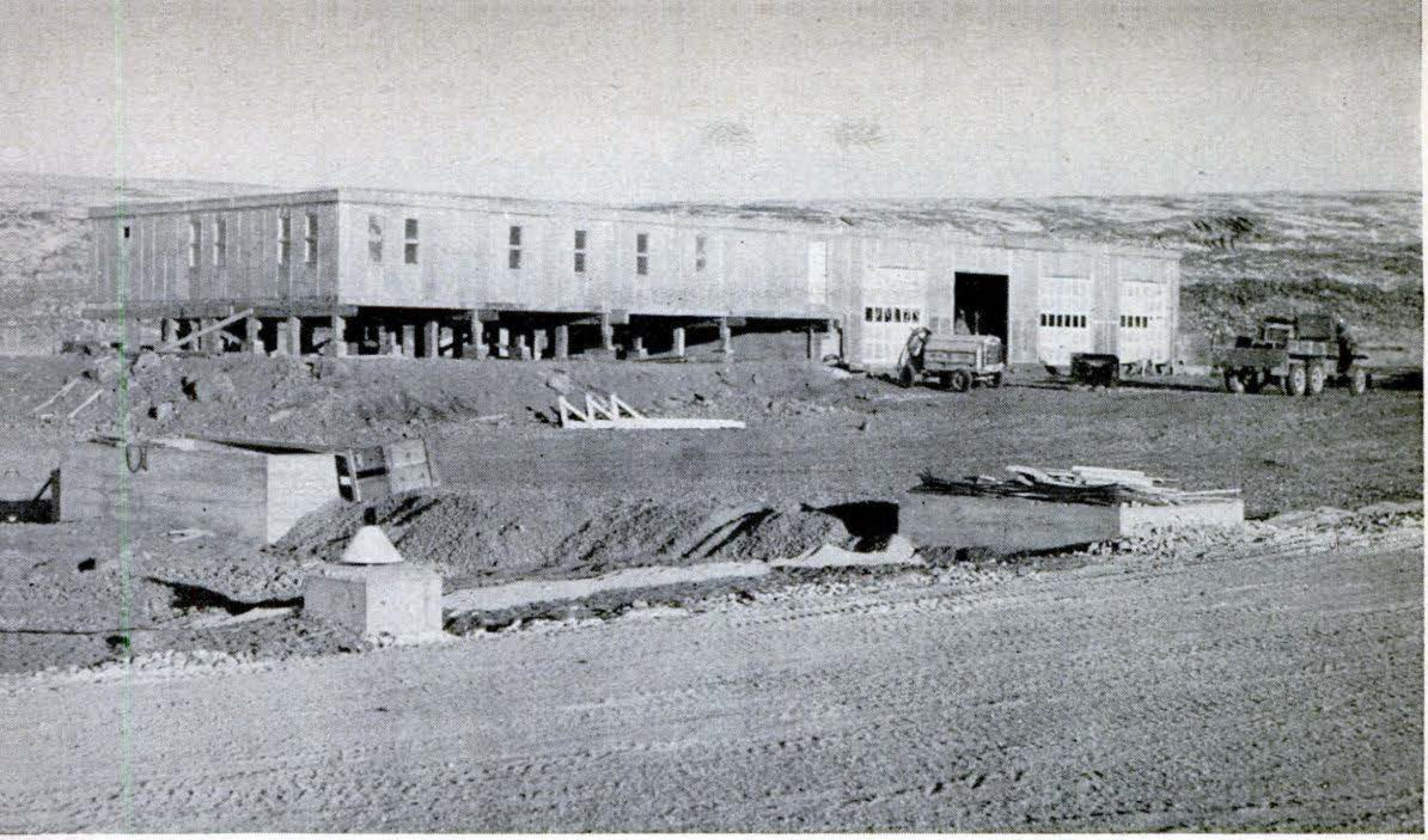

BUILDINGS in world's northernmost inhabited area are erected on permafrost, eternally frozen ground that goes down, engineers estimate, 1,600 feet. So they are put on stilts to keep their heat from melting the foundations. Structures like these house mess halls and laundries. You can get a batch of shirts washed and ironed in 48 hours.

HEADLIGHTS of cars and trucks create patterns on film during long Arctic nights. Visitors are speechless when they descend into 480 acres of civilization after flying eight to 10 hours from Greenland's tip over nothing but icy seas and snowy mountains. Thule's annual snowfall is 15 inches—Goose Bay, Labrador, 1,600 miles south, gets 182 inches.

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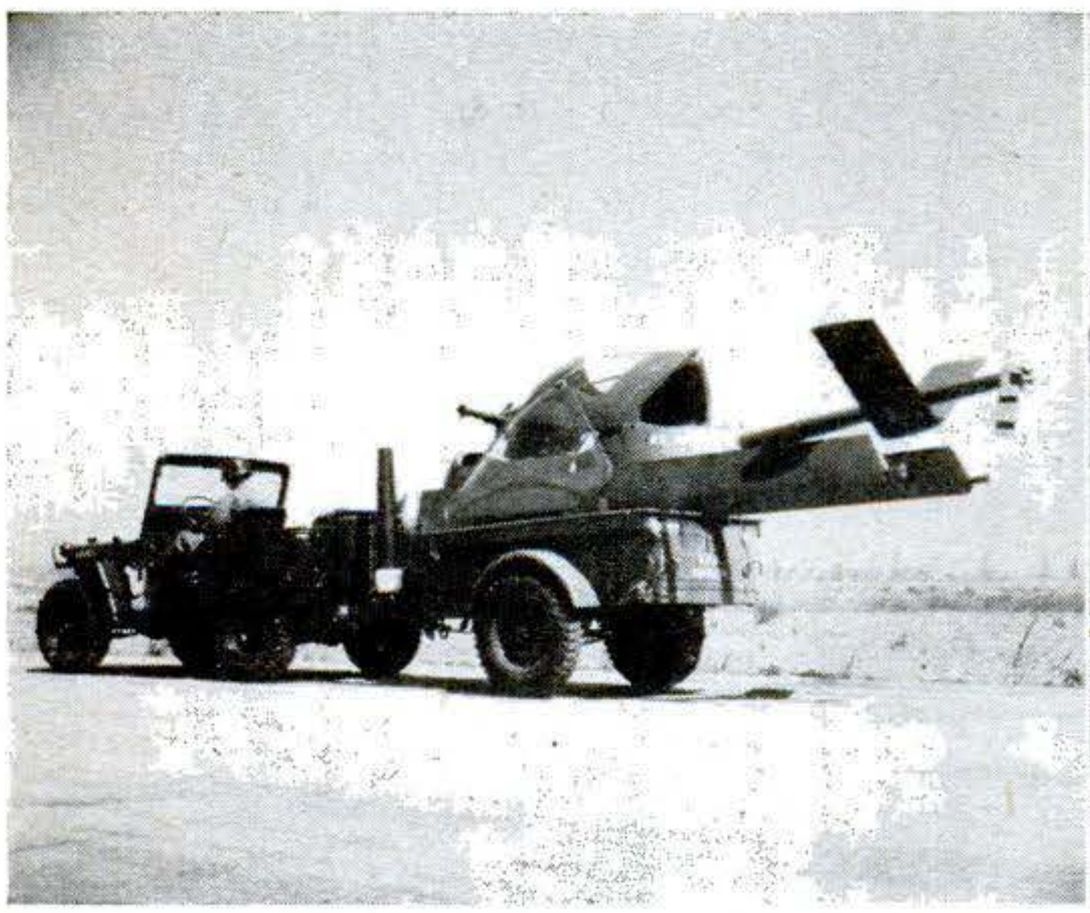
Army's Flying Jeep Put Together in 20 Minutes

NO LONGER need the Army air-drop food and ammo to a few trapped GIs. Parachuting down may go a put-it-together-yourself helicopter kit and a pilot. Twenty minutes later the infantrymen can fly out of their hole.

That's the XH-26 Jet Jeep. It weighs 300 pounds, comes in eight parts that can be assembled in 20 minutes by two men with a wrench and pliers. It can be delivered by jeep trailer or in a parachute container measuring five feet square and 14 feet long.

The jeep 'copter's two pulse-jet engines, one at each rotor-blade tip, have only one moving part apiece—a valve that admits air in spurts. They'll burn gasoline, kerosene or even Diesel oil, and need only 50 gallons to keep the craft in the air an hour and a half. Top speed is 80 miles an hour. The Jet Jeep can tote double its own weight, including two men in outboard litters. American Helicopter Co. is building it.



1 DISASSEMBLED, Jet Jeep can be hauled in a jeep trailer, as above, or packed in a small container and dropped by parachute to troops trapped in mountains or arctic wastes.

2 TWO-MAN TEAM unloads the eight parts of the helicopter and arranges them on the ground. Model shown here is a nonflying mockup used to train troops in assembly.

5 THIRTY SECONDS LATER rear of upper fuselage is raised on hinges and locked in place. V-shaped tail carries a small, belt-driven rotor that aids in directional control.

6 WITH WINDSHIELD fitted and fastened, soldiers put two plastic doors in place (20 minutes). Fill the fuel tank and the midget helicopter is ready for take-off.

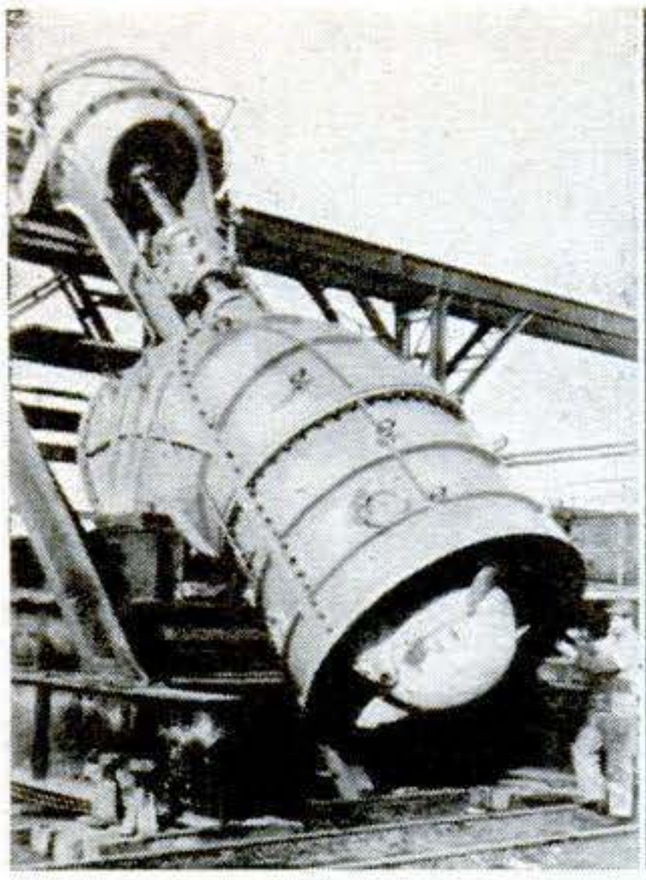
"The Flying Bathtub" is what infantrymen are already calling their new midget jet 'copter.

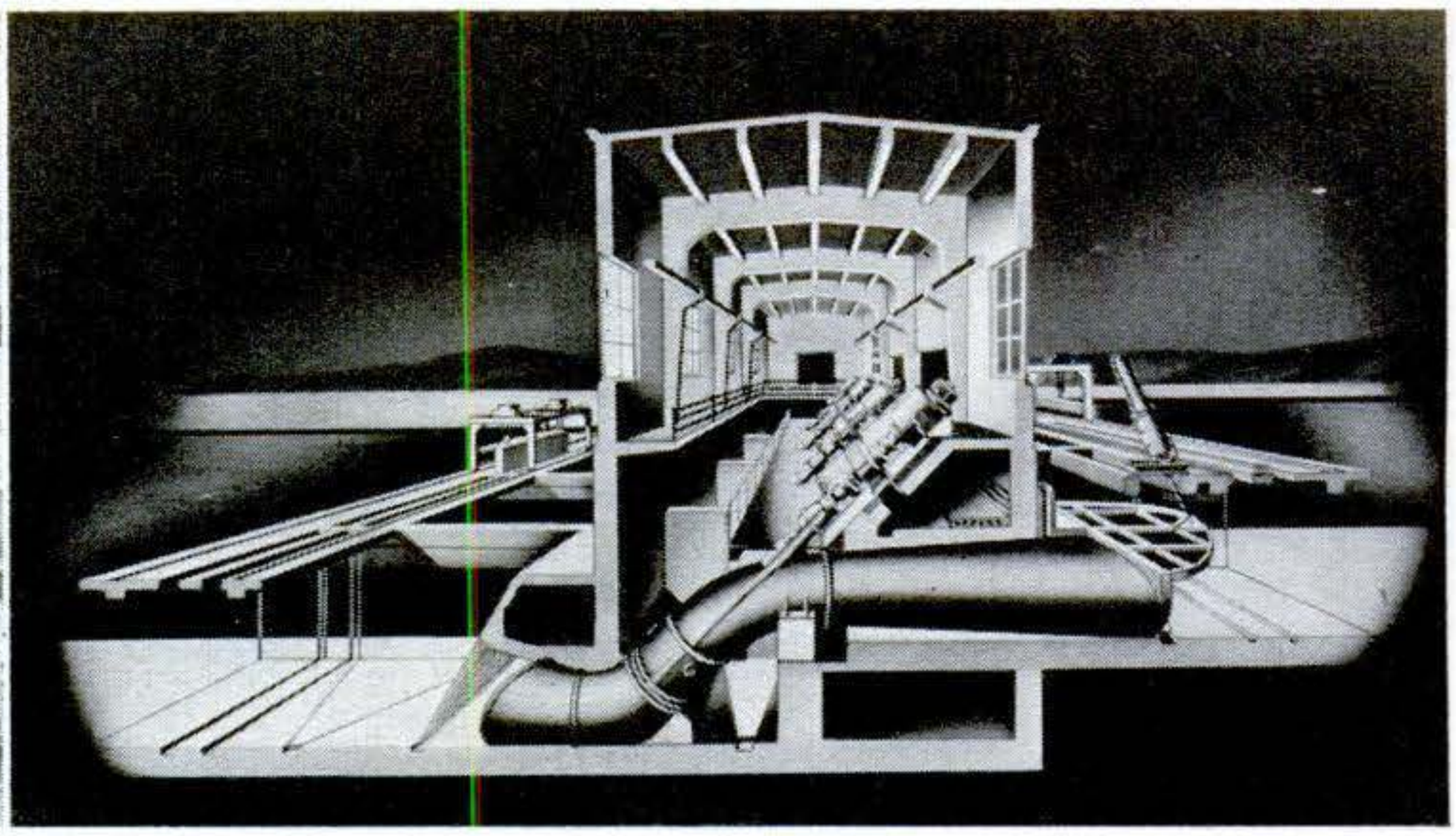
3 TEN MINUTES AFTER START, upper and lower parts of fuselage have been joined. Here soldiers are attaching tubular skids that are used instead of wheels for snow landings.

4 ROTOR BLADES are attached to the hub, need only bolt tightening. Time: 16 minutes. Standard jeep-carried tools, principally wrench, are used to assemble the helicopter.

7 PULSE-JET ENGINES, mounted on rotor-blade tips, resemble stovepipes, are three feet long, five inches in diameter. Jet Jeep can fly on one engine, land with power turned off.

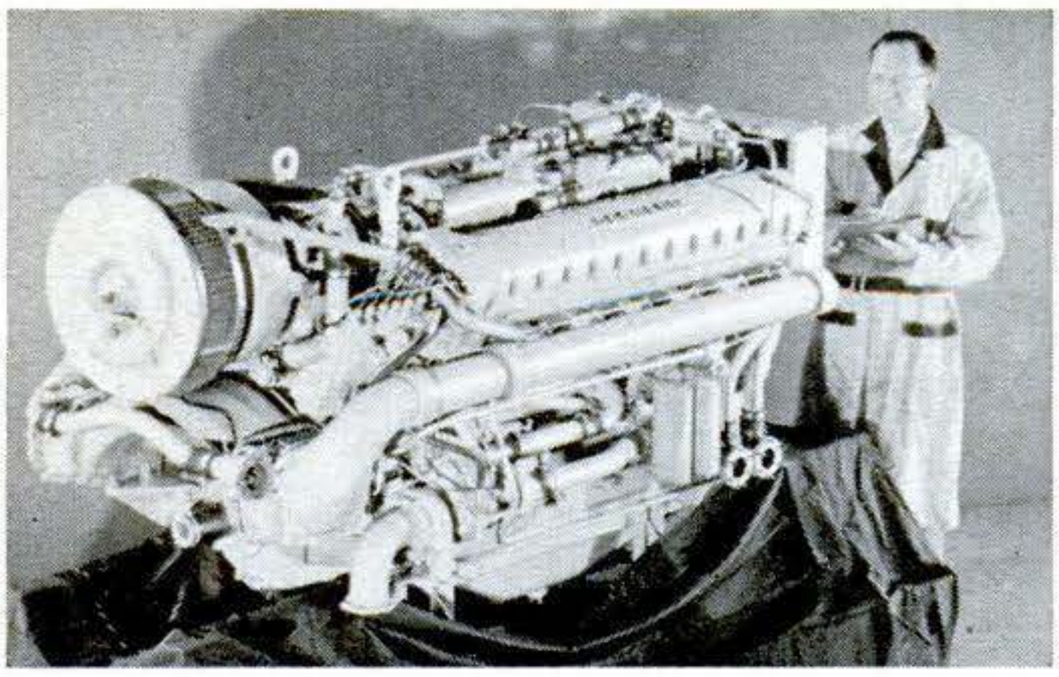
8 PILOT PRESSES BUTTON in control stick, injecting compressed air and fuel into the engines. As a spark plug ignites the mixture, engines start pulsing and blades whirl.





Giant New Screw Pumps to Irrigate the Nile River Delta in Egypt

In the days of the ancient Pharaohs, the Egyptians used screws to raise water from the Nile for irrigation. This pumping station now being built by German engineers at Qasabi, Egypt, employs the same principle on an enormous scale. Four screw pumps, each driven by a 445-horsepower electric motor, will pump a total of 7,920 gallons of water per second. Photo (above left) shows one of the huge 45-degree-angle pumping tubes with built-in propeller. Drawing gives general layout of the installation.



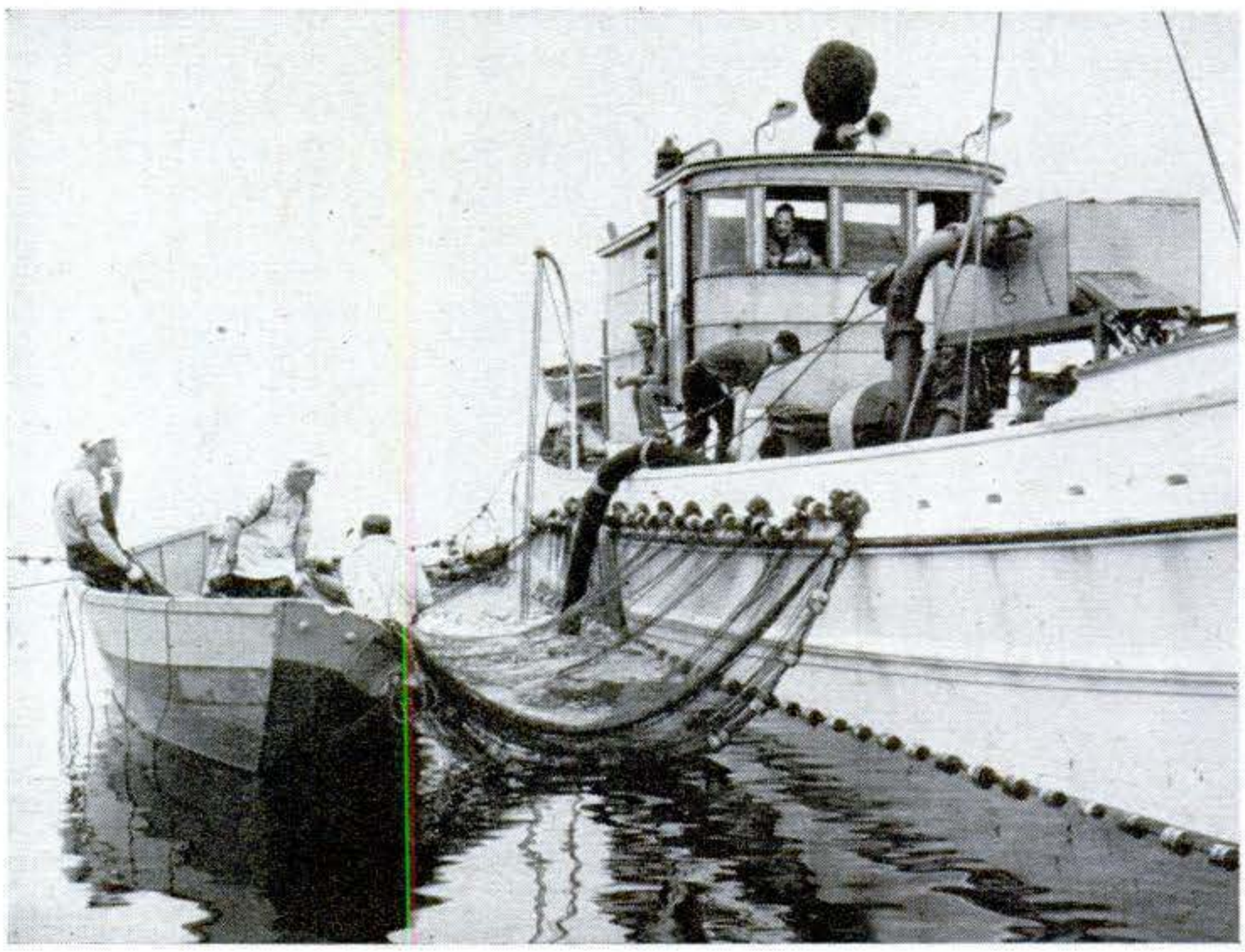
Aluminum Diesel Saves Weight

Currently in production for the Navy, this 600-horsepower V-12 Diesel is largely aluminum and weighs 3,250 pounds—only 5.41 pounds per horsepower compared with an average of 25 pounds for similar power plants. The big cylinder block and crankcase are an integral aluminum casting. The light metal is used for oil pan, manifolds and many other parts. The engine may also be put into large trucks and buses.

Suction Hose Makes Quick Work of Loading Fish Aboard Ship

Maine sardine fishermen are using a new method to haul their catch aboard the carrier vessel in one-third the usual time. A rubber hose connected to a pump is lowered into the fish-filled nets. The sardines are sucked up through the hose and chuted into the hold at the rate of 65 tons an hour. Similar equipment unloads the cargo at the cannery dock.

Six inches in diameter and 30 feet long, the hose is made by the B. F. Goodrich Co.



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Europe's Speed King Builds a Family Car

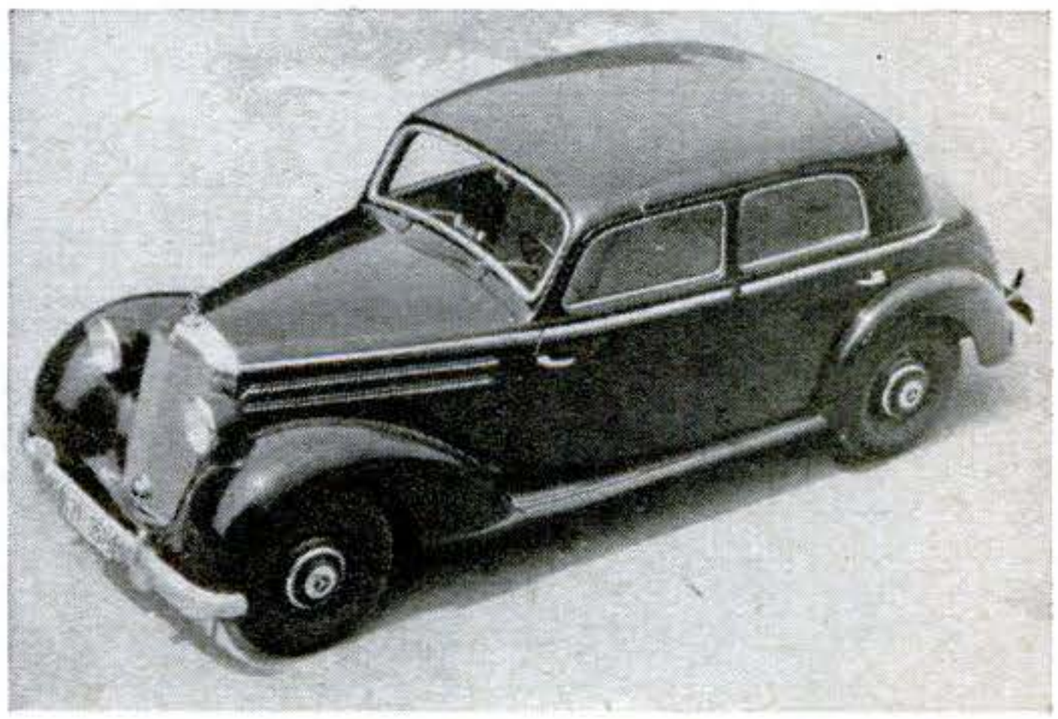
Two Mercedes-Benz entries are shown winning this year's 24-hour race at Le Mans, France.

Here's what one proud owner thinks of the new little Mercedes —small-car economy, big-car comfort, racing-car ruggedness.

By Carl de Suze

ONE of the world's most famous builders of racing and luxury cars, Mercedes-Benz, is now turning out big-acting little sedans priced to suit middle-size pocketbooks—even mine.

My wife and I bought one—a four-cylinder, 52-horsepower, five-passenger 170 S—at the factory on the outskirts of Stuttgart, Germany, last June. Four days earlier, two Mercedes racing cars had snatched first and second places in the grueling, 24-hour endurance run at Le Mans, France. We were excited at the prospect of owning a car by the same maker.



New Mercedes 170 S is author's pride and joy.

The model we chose, which cost $2,300, made a hit with us at first sight. Later, when we had driven it over the Alps and all around Italy, covering some

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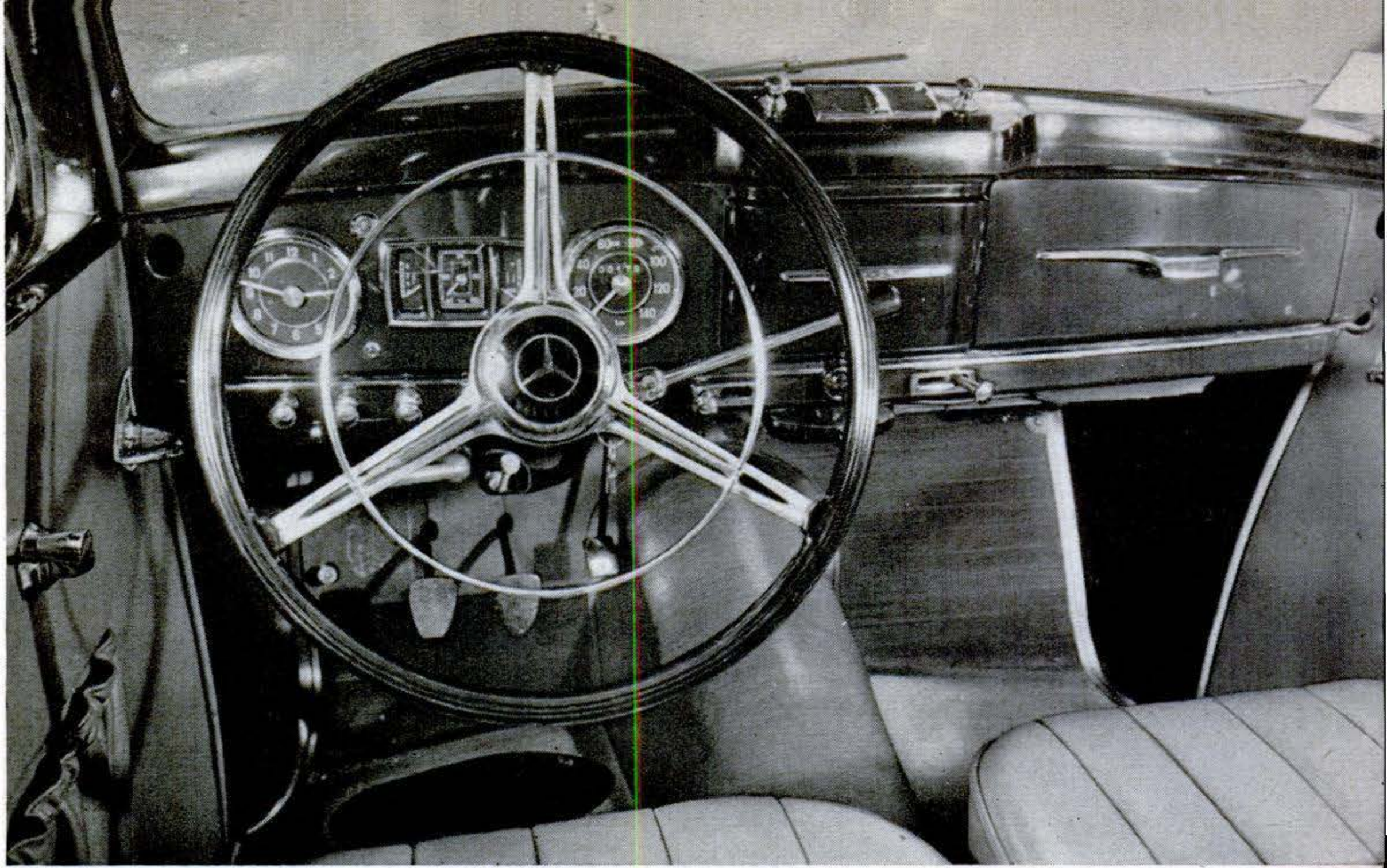

SUPERB CABINETWORK marks the new Mercedes, which also offers such unusual features as defrosting jets for front doors as well as windshield, and reserve one-gallon fuel tank.

of the most difficult roads in Europe, we were completely in love with it.

The Mercedes 170 S, just becoming available in the U. S.—for a good many hundred dollars more than I paid for mine—is light, fast, economical, highly maneuverable and surprisingly comfortable. It weighs only 2,688 pounds, about the same as the new Willys. Its top speed is supposedly 75 miles an hour, but it will do better if pressed. And though we certainly weren't coddling our car, we got more than 25 miles to the gallon.

It's Bigger Than It Looks

My wife, who had anticipated a cramped, small-car feeling when riding in the little Mercedes, was pleased to discover that there was none. The rear seat is as wide as the average Detroit model's. The two front seats are of the "hug me" bucket type. The right-hand one leans back like an airliner seat and has an adjustable headrest.

I was most impressed by the way the car climbed and cornered. The 170 S has four forward speeds, and in first it will climb one foot for every 2⅓ feet it travels forward. Even in third gear, we roared up through the rugged St. Gotthard Pass at 40 miles an hour, past cars that were laboring hard at 10.

Speed Makes It Squat Lower

Downgrade, autos ahead of us rolled into Italy with smoking brake bands. With our light weight, smooth braking and strong motor pull, we came down off the Alps as cool as could be. We did have to shift more often than in most American cars, though, in order to avoid overheating. This was essential, for we were driving through some of the hottest weather Europe had had in 20 years.

Once back on level ground we gave the Mercedes full throttle. It fairly squatted on the road. And the springing is so good that even on rough stretches we might have been driving from a hammock.

Our garageman is going to find the little car a joy to work on. When an average owner like myself, and a poor dub at machinery at that, finds everything easy to get at and understand, I'm sure the boys in the pit will be glad to see us.

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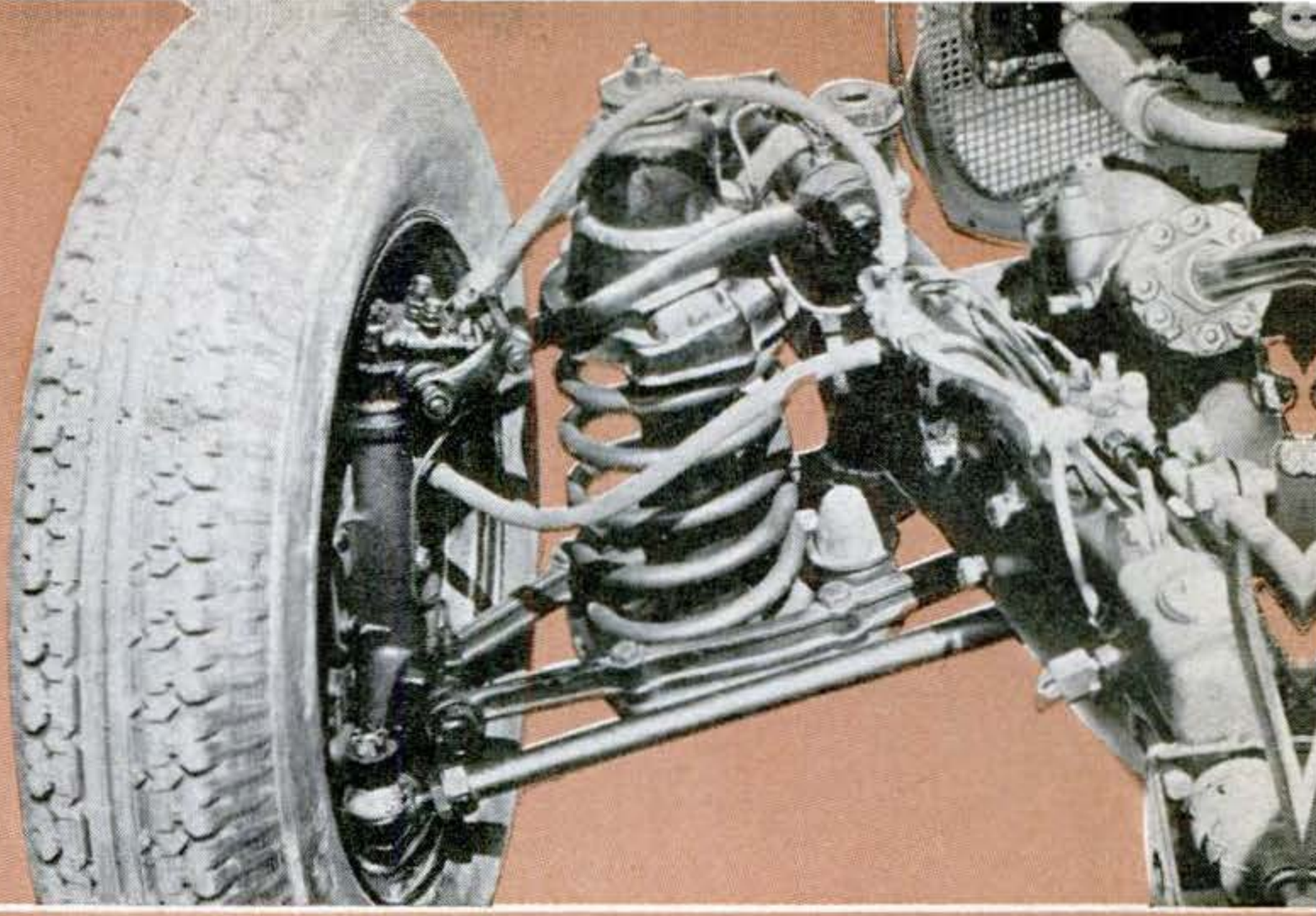
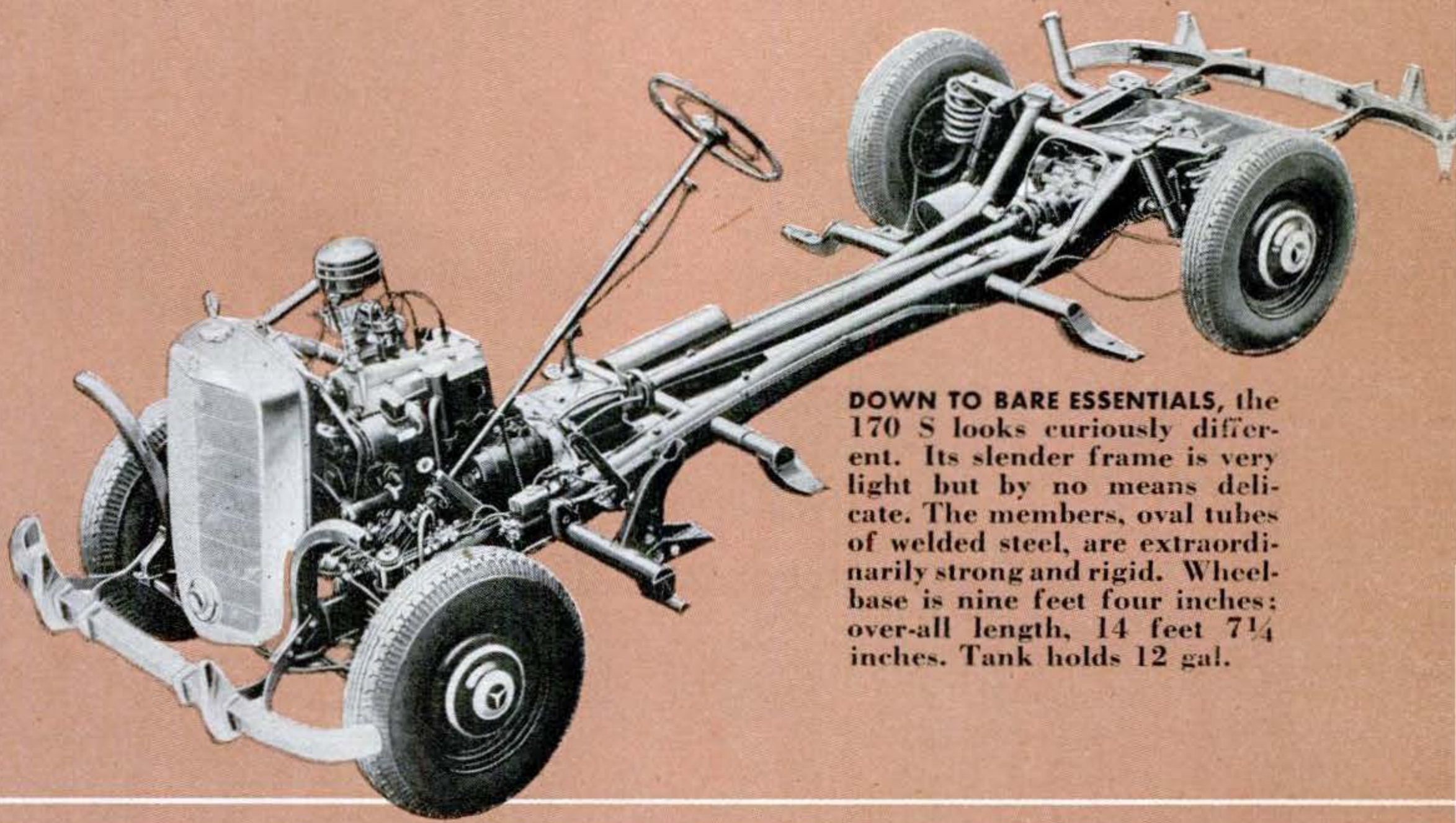
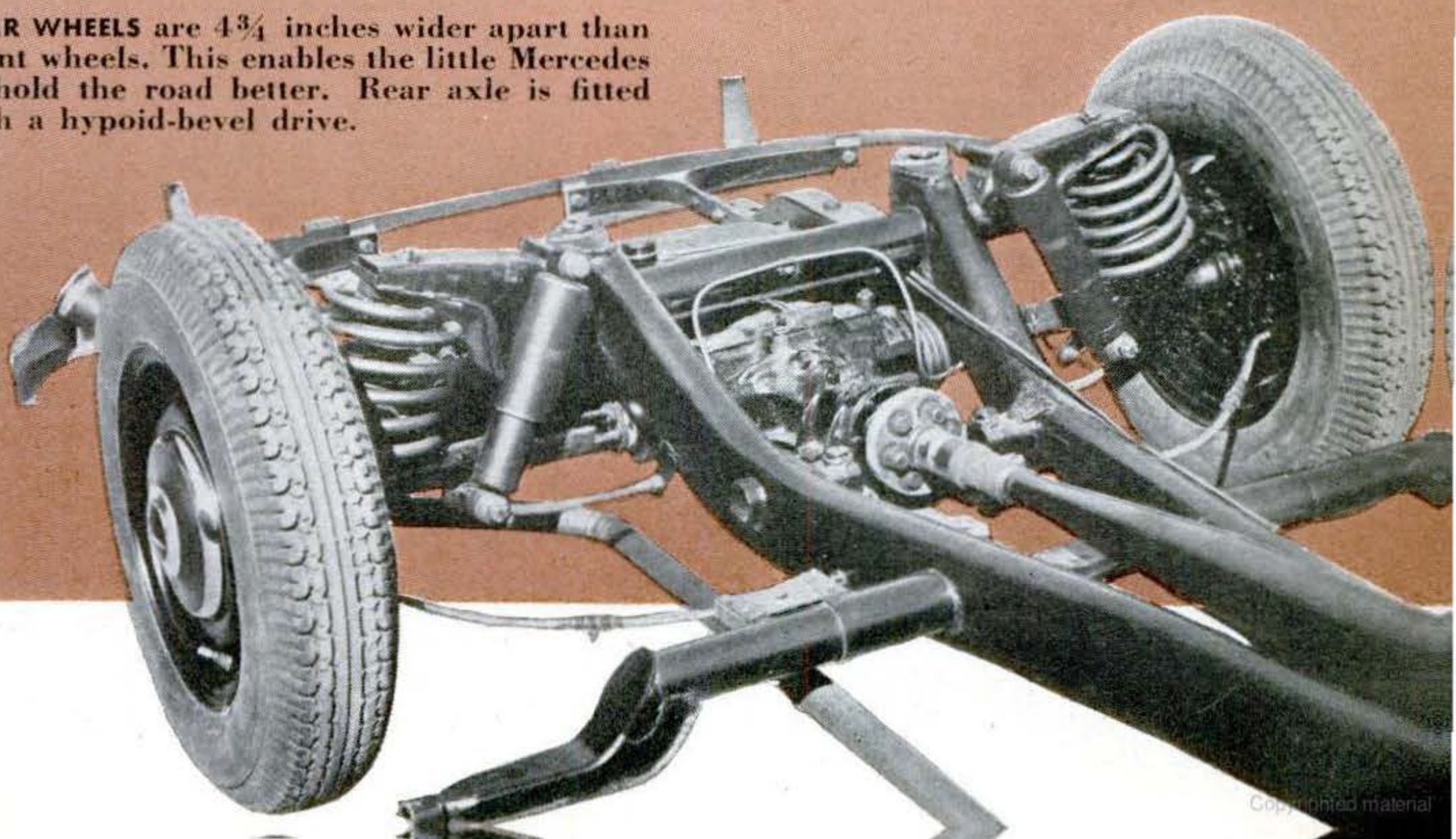


FRONT WHEELS have special rubber mounts that permit them to camber at high speeds so they will spread slightly apart and squat down to grip the road. All four wheels are independently sprung, as are those on company's other cars. The Mercedes, named for a plant manager's daughter, was first to have this.



DOWN TO BARE ESSENTIALS, the 170 S looks curiously different. Its slender frame is very light but by no means delicate. The members, oval tubes of welded steel, are extraordinarily strong and rigid. Wheelbase is nine feet four inches; over-all length, 14 feet 7¼ inches. Tank holds 12 gal.

REAR WHEELS are 4¾ inches wider apart than front wheels. This enables the little Mercedes to hold the road better. Rear axle is fitted with a hypoid-bevel drive.



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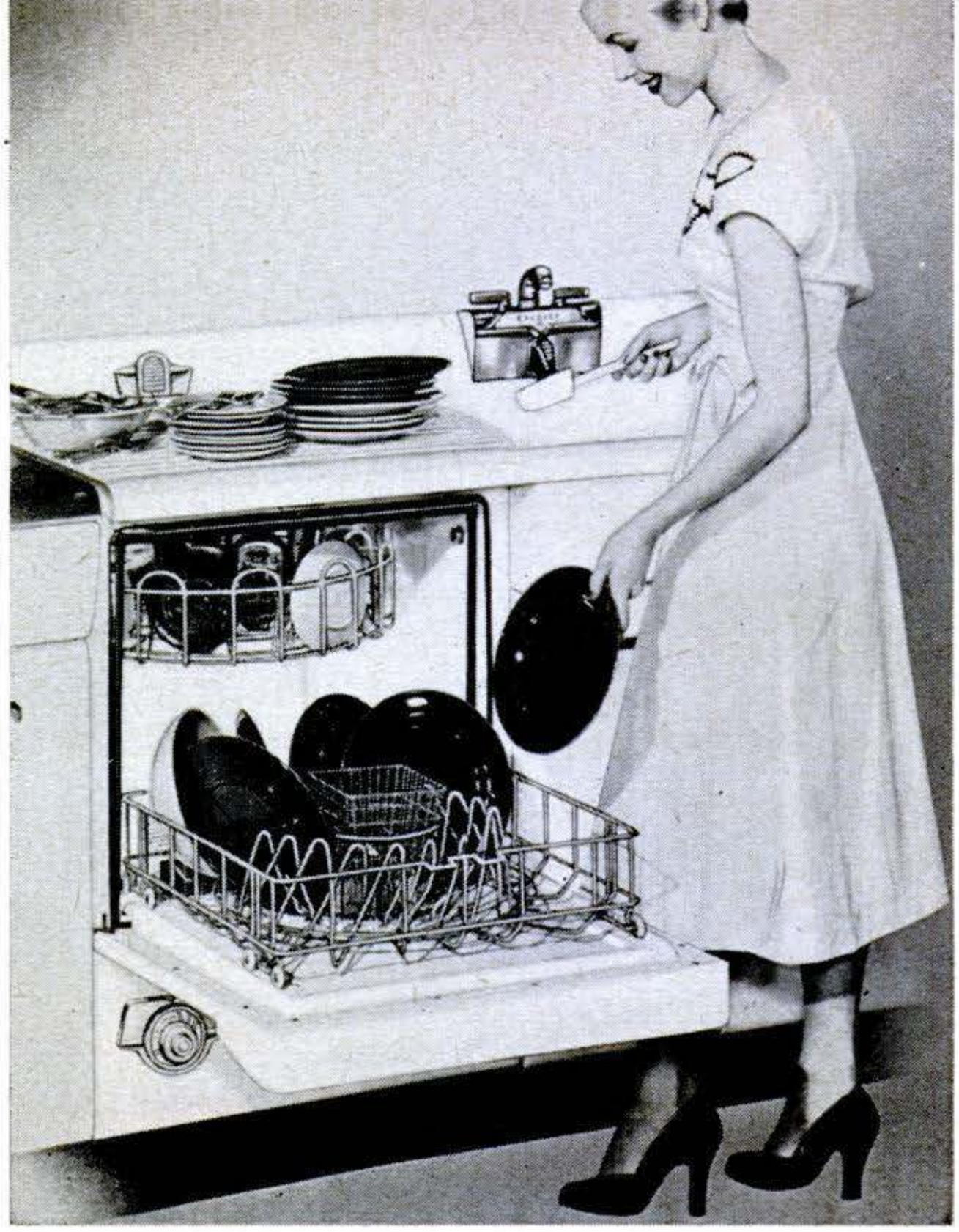
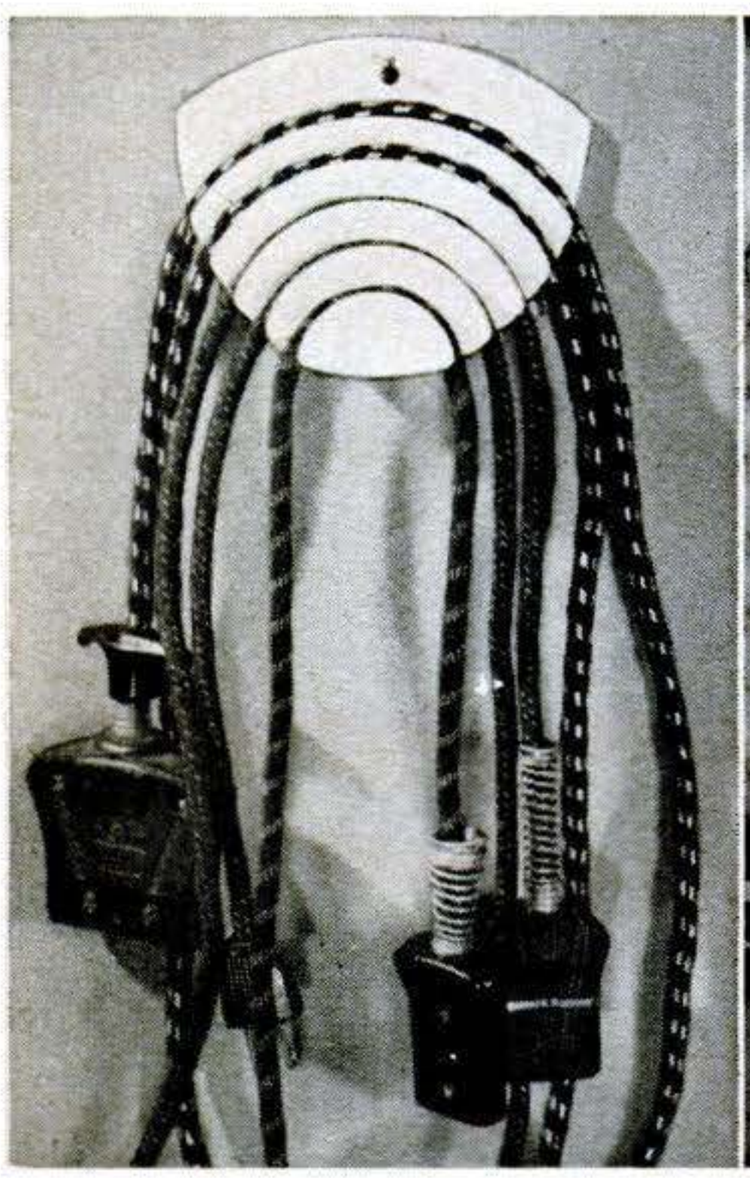
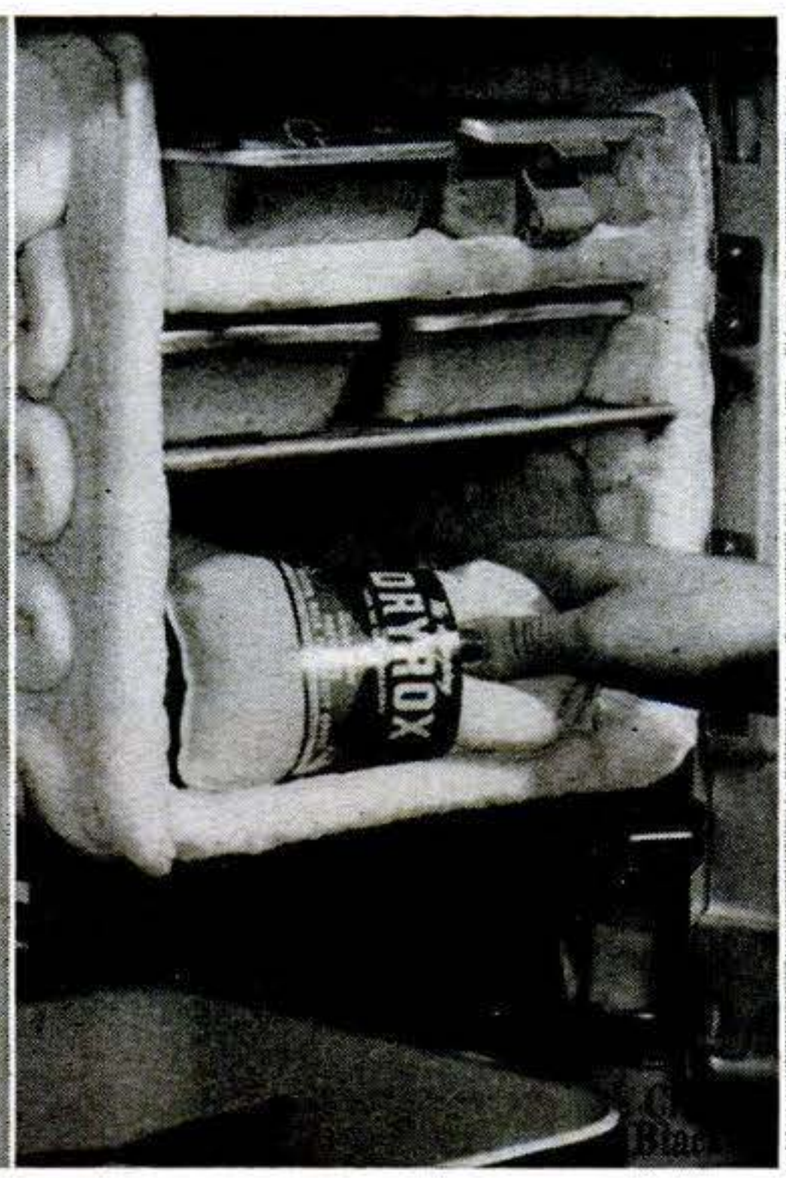
New Life for Your Kitchen



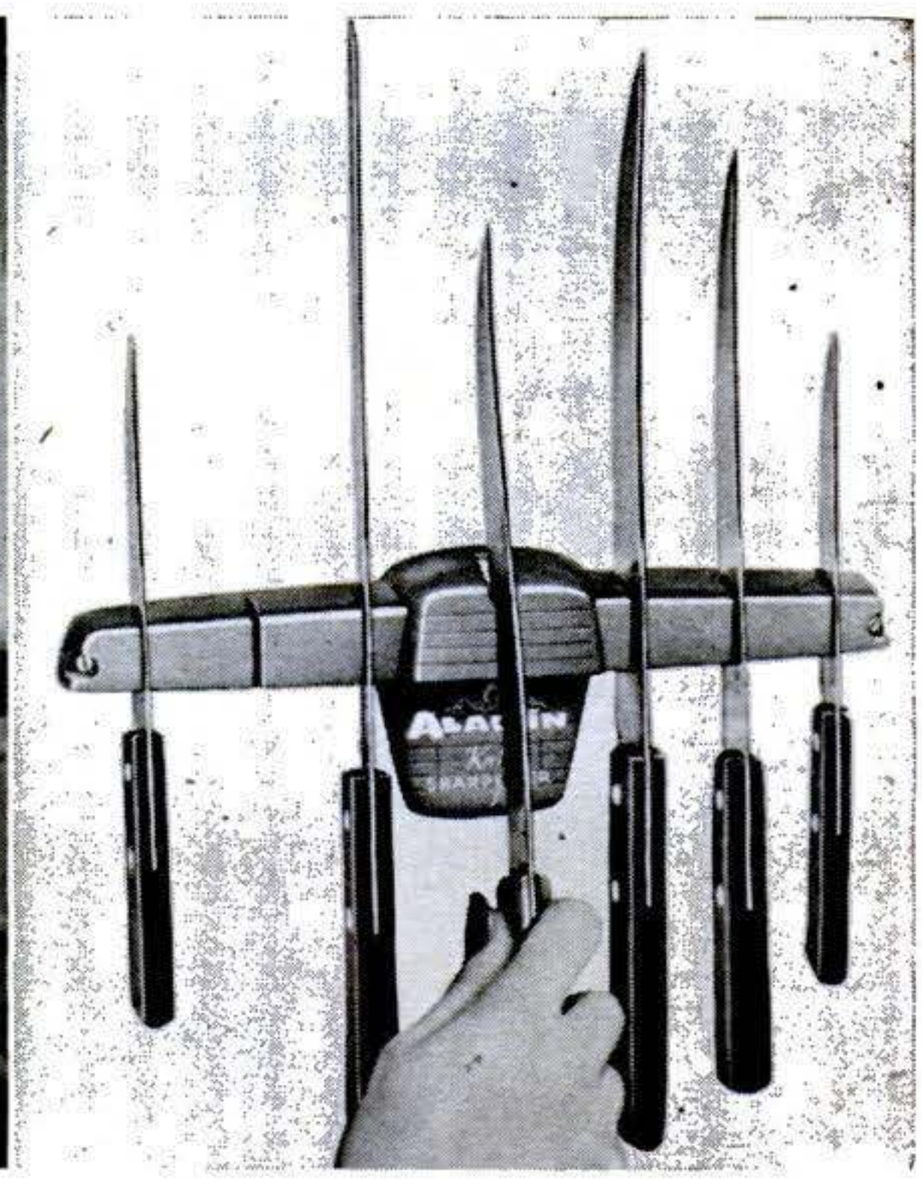
1. Stop-and-Go Dishwasher. If you forget a dirty dish, you can stop the new Crosley and add it to the rest without losing the hot water inside. The upper rack revolves with the swirling spray so that dishes are always in contact with the wash water and cannot be shielded from it by large pots and pans in the fixed lower rack.



4. Cord Hanger. Appliance cords hang in five grooves molded into this glazed ceramic wall hanger. Suspending the cords in wide arcs prevents breakage of the tiny copper wires, keeps cords kink free. Holder comes in red, yellow or green.



5. Dehumidifier. Slip this bag of crystals into freezer or refrigerator and you won't have to defrost so often. Where defrosting is automatic, Dryrox reduces sweating. Crystals turn pink to signal they should be revitalized by warming.



6. Knife Rack. The carbide sharpener in the center of this wall-mounted rack is always on deck and ready for action. On each side of the sharpener, three slots with concealed spring grips hold tight to any type of knife blade.

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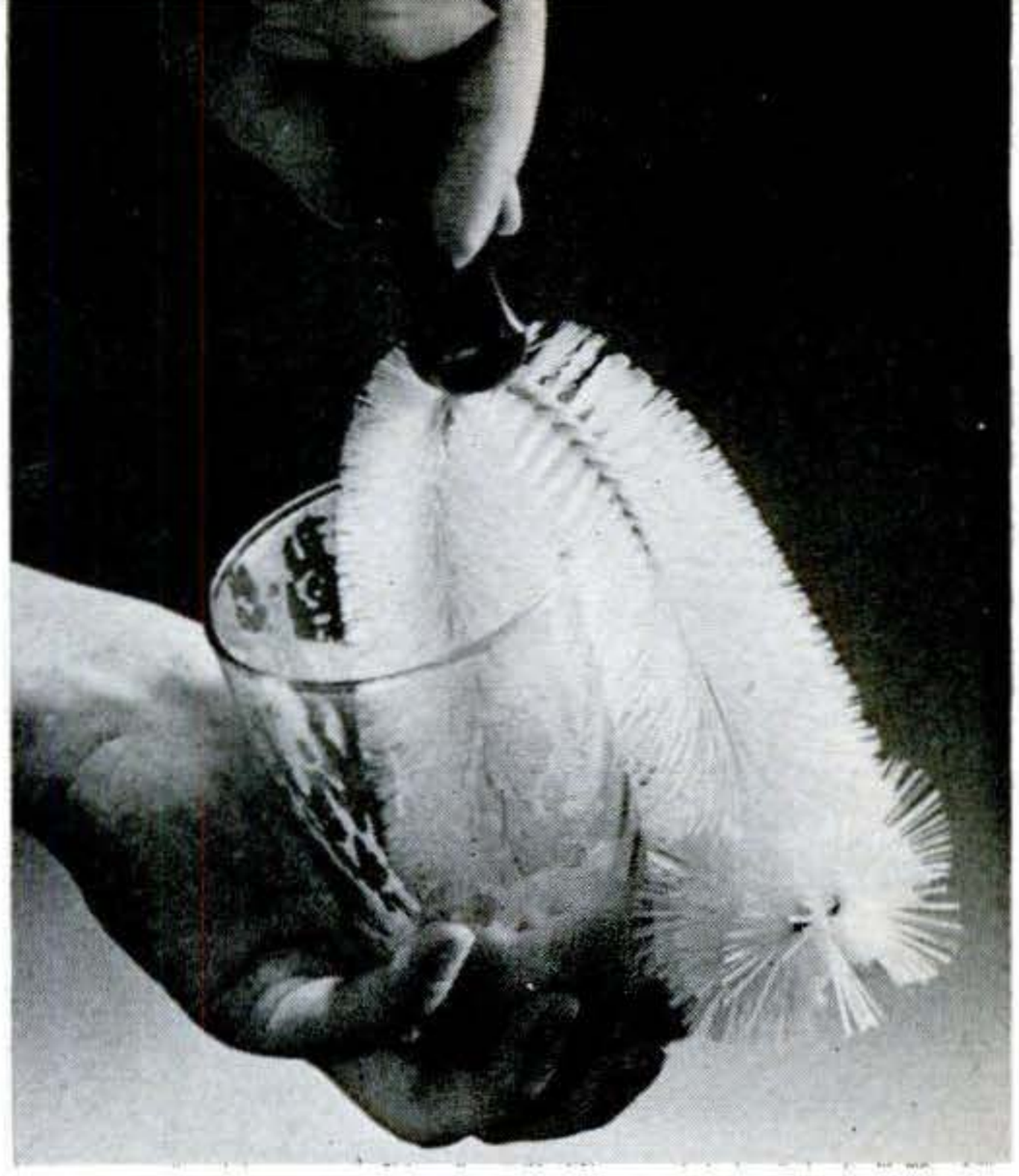
2. Stove Protector. There's a spoon tray at one end of this stove mat to hold sticky mixing tools and catch drips. The ventilated rubber mat has a waffle-like surface that acts as a cushion to protect stove enamel from accidental bumps. It not only guards against chips, but makes a safe spot on which to park hot pots.



3. Dishwashing Brush. The V-shaped brush above scrubs glasses on the inside and outside at the same time, or with one swipe washes the tops and undersides of plates. The brush can also be used to do a fast but effective job on cutlery, the nylon bristles easily getting between the tines of forks and in other small crevices.

7. Hide-Away Cart. Pull out one side of the Marlboro stove and it parts company with the rest of the appliance, providing extra working space on a rolling cabinet. A removable cutting board forms the top.

8. Porcelain Finish. Want an all-colored kitchen? This refrigerator enamel can be tinted with oil colors. It is said to be tough enough to withstand boiling water, grease, alcohol and constant scrubbing.

Further information on these products can be obtained from: 1. Crosley Division, Avco Mfg. Corp., Cincinnati 25; 2. Wooster Rubber Co., Wooster, Ohio; 3. Black & Co., 99-20 Metropolitan Ave., Forest Hills, N.Y.; 4. Mary L. McKinney, Box 1282, MPO, Los Angeles; 5. Dryrox, Inc., 2800 Beauchamp, Houston; 6. New England Carbide Tool Co., Cambridge 39, Mass.; 7. Cribben & Sexton Co., 700 N. Sacramento Blvd., Chicago; 8. Sapolin Paints, Inc., 229 E. 42nd St., NYC.

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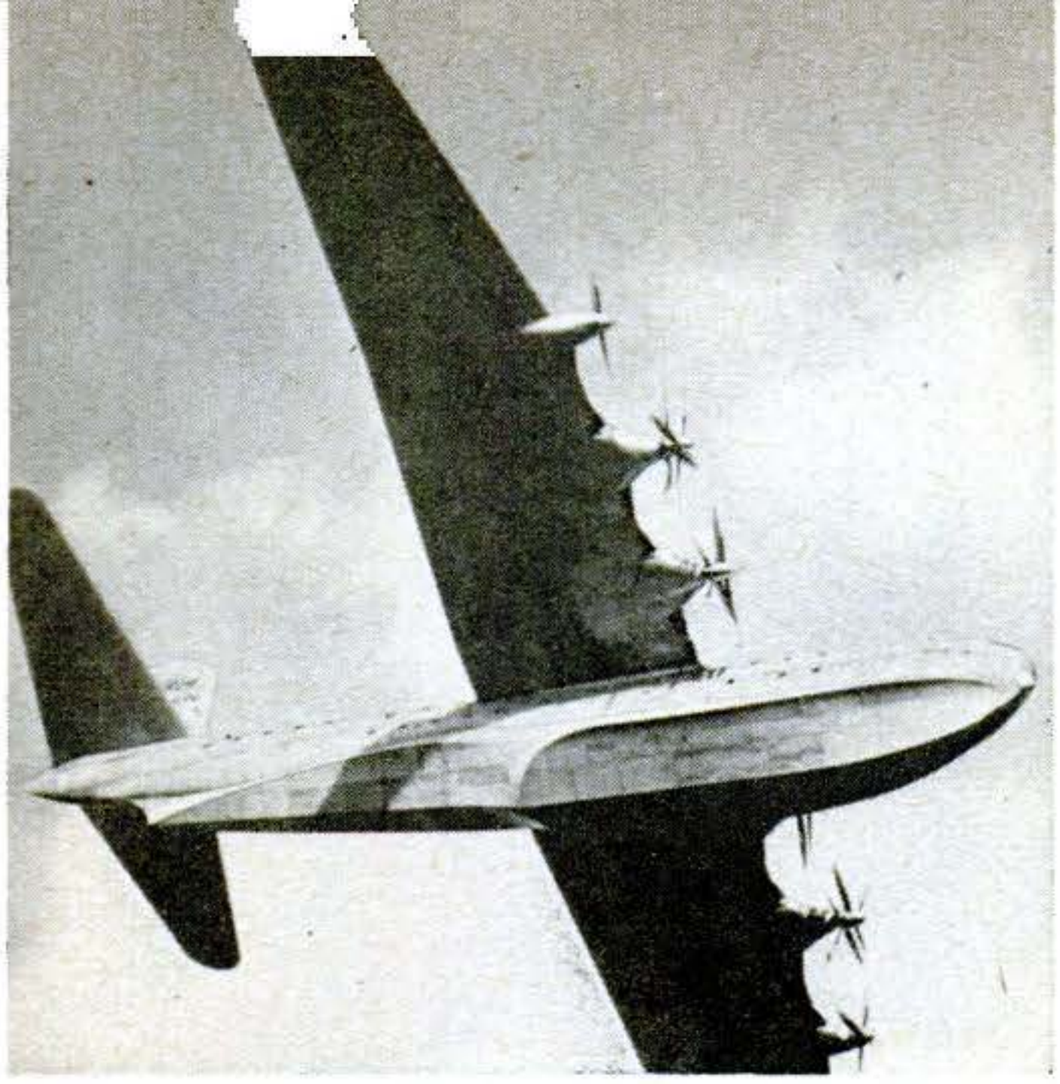
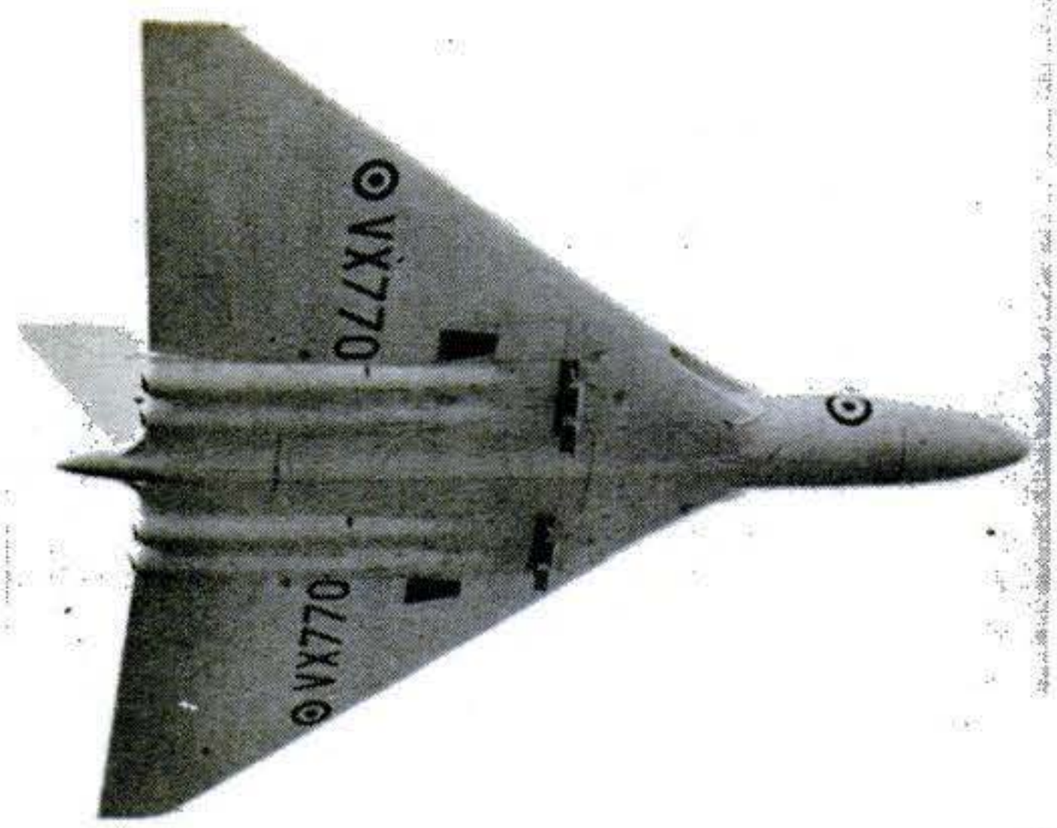


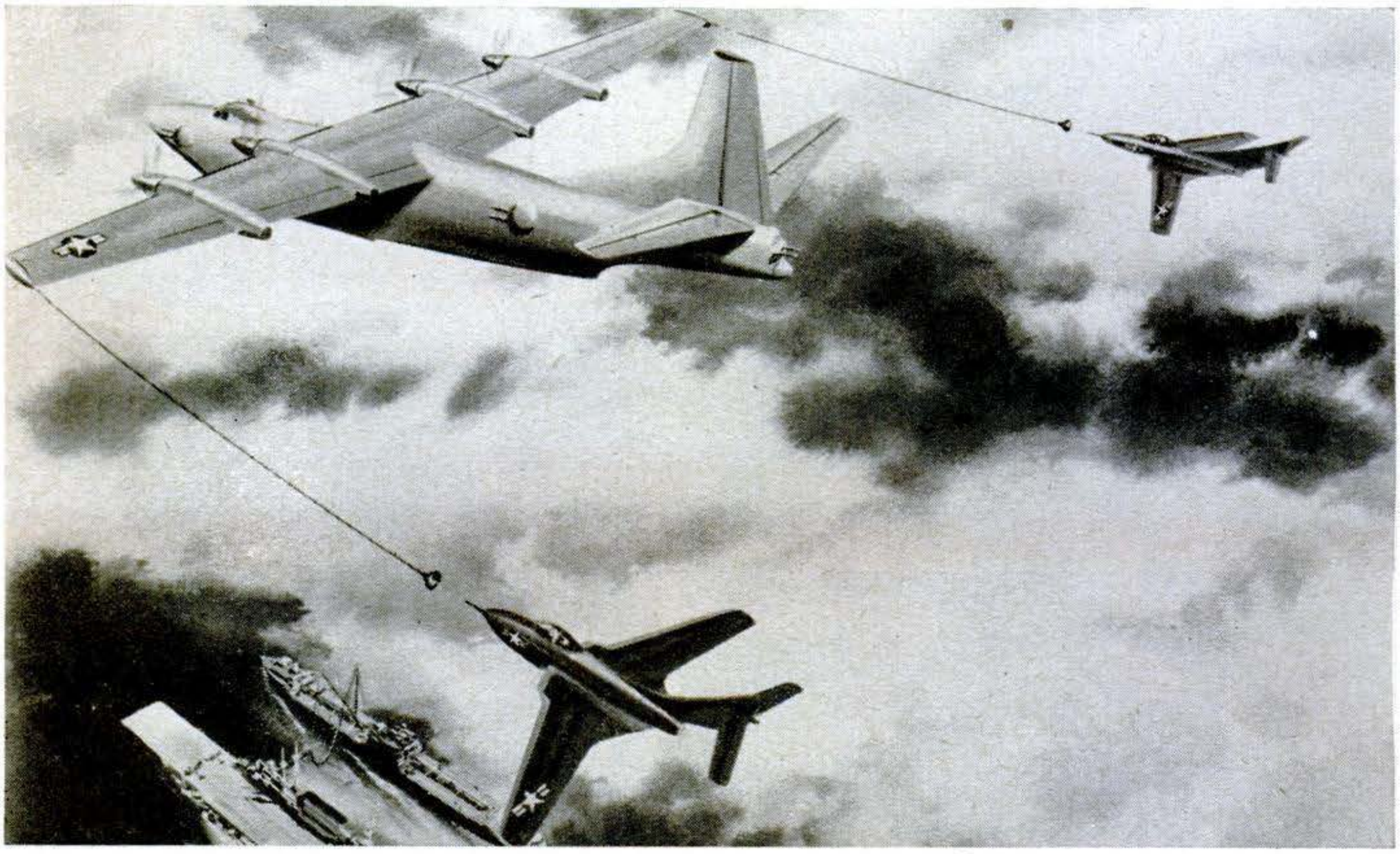
Turboprop Princess Flies

BRITAIN'S 140-ton, 10-engine Saro Princess flying boat is shown above in one of its first trial flights. The propellers of the huge plane, which can carry 100 passengers or 200 troops, are driven by Bristol Proteus gas-turbine power plants. Outboard nacelles on each side house single engines, while the four inboard nacelles contain coupled twin engines.



New Bomber Has Delta Wing

ON ITS recent maiden flight, Britain's big experimental bomber, the four-jet delta-wing Avro A 698, approached the speed of sound. Its shape, which allows for a large bomb load, also would permit the plane to carry a large number of passengers in a civil transport version. The four Rolls-Royce Avon turbojet engines are buried in the wing roots of the plane.



Flying Tanker to Extend Range of Carrier-Based Fighters

NO LONGER will Navy planes have to come in for a deck landing to refuel. It can be done in mid-air, as shown above. Two jets are here about to stick their needle noses into funnels at the ends of hoses dragged by the tanker plane. The Navy will use AJ-1 Savages, its heaviest carrier-based planes, for tankers.

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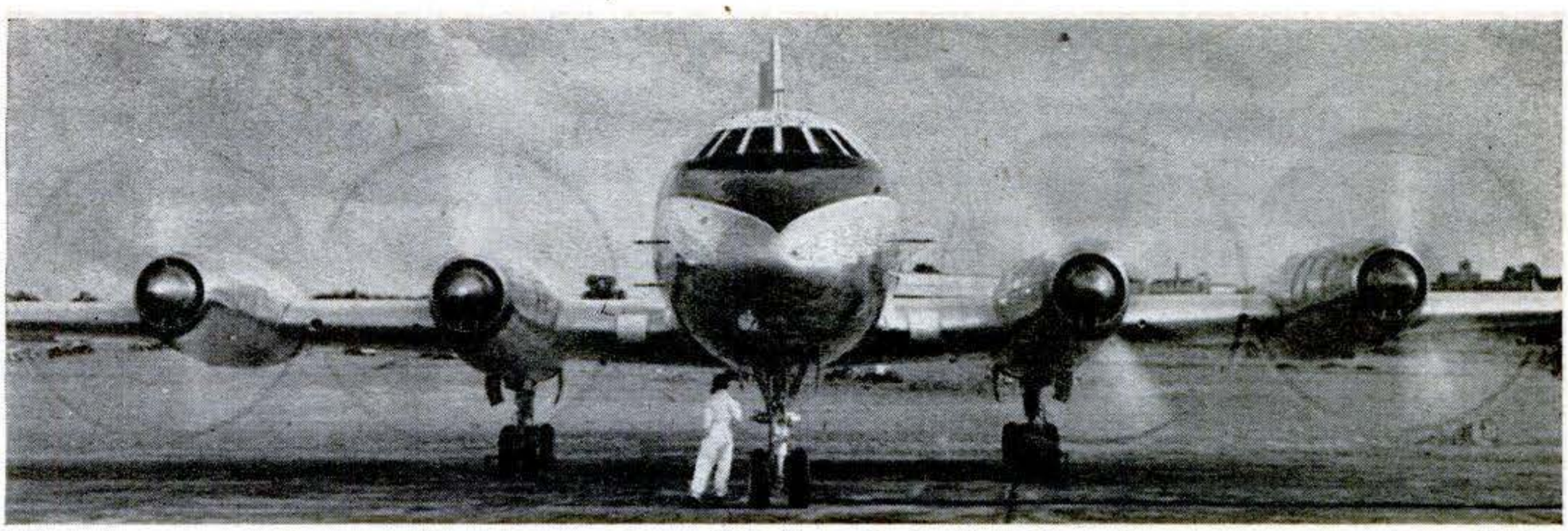


Warming up its four turboprop engines, 114-foot Bristol Britannia prepares for first flight.

Four-bladed propellers are nearly stopped by a high-speed camera as the big plane takes off.

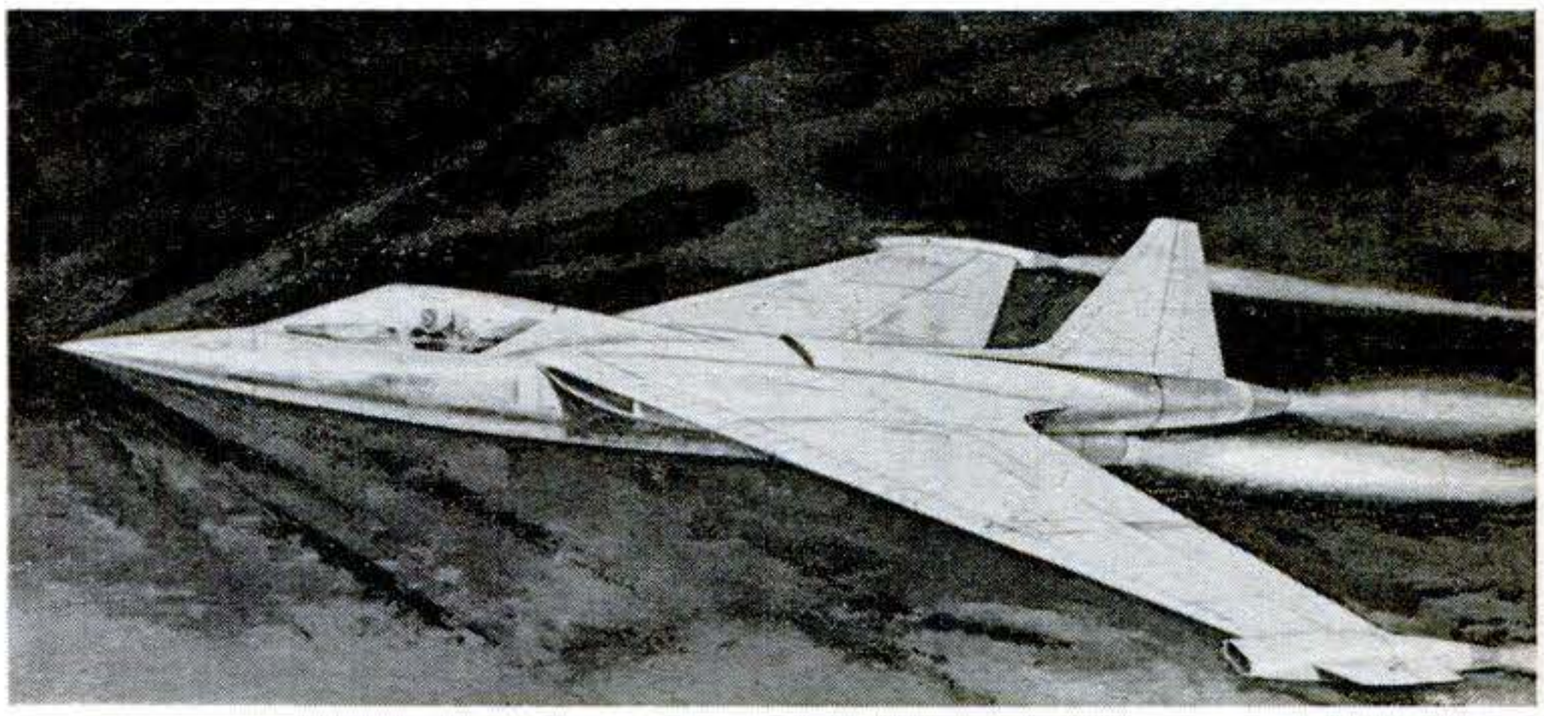
Turboprop to Speed Pole-Hopping Tourists

OVER-THE-POLE flights from London to Tokyo are planned for Britain's big new turboprop airliner, the Bristol 175 Britannia. Now in production, 25 of these 400-mile-an-hour planes are expected to be delivered by 1954 to British Overseas Airways, which will use them for high-speed, low-fare transocean travel on many routes.

Although its speed is less than that of the all-jet Comet, the Britannia likewise flies without vibration and high above turbulence. Its four turboprop engines (gas turbines driving propellers) are also more economical than the Comet's jets, and it carries more passengers—50 on long-distance hops, 104 on shorter runs.

Glass Plane May Beat Friction Heat of Supersonic Flight

IF PLANES are to fly 2,000 miles an hour, they can't be made of the best metal alloys in use today. Metal cannot take the skin-friction heat of such speeds. Tom Piper, Northrop Aircraft engineer, suggests a plane (right) of glass-plastic laminate.



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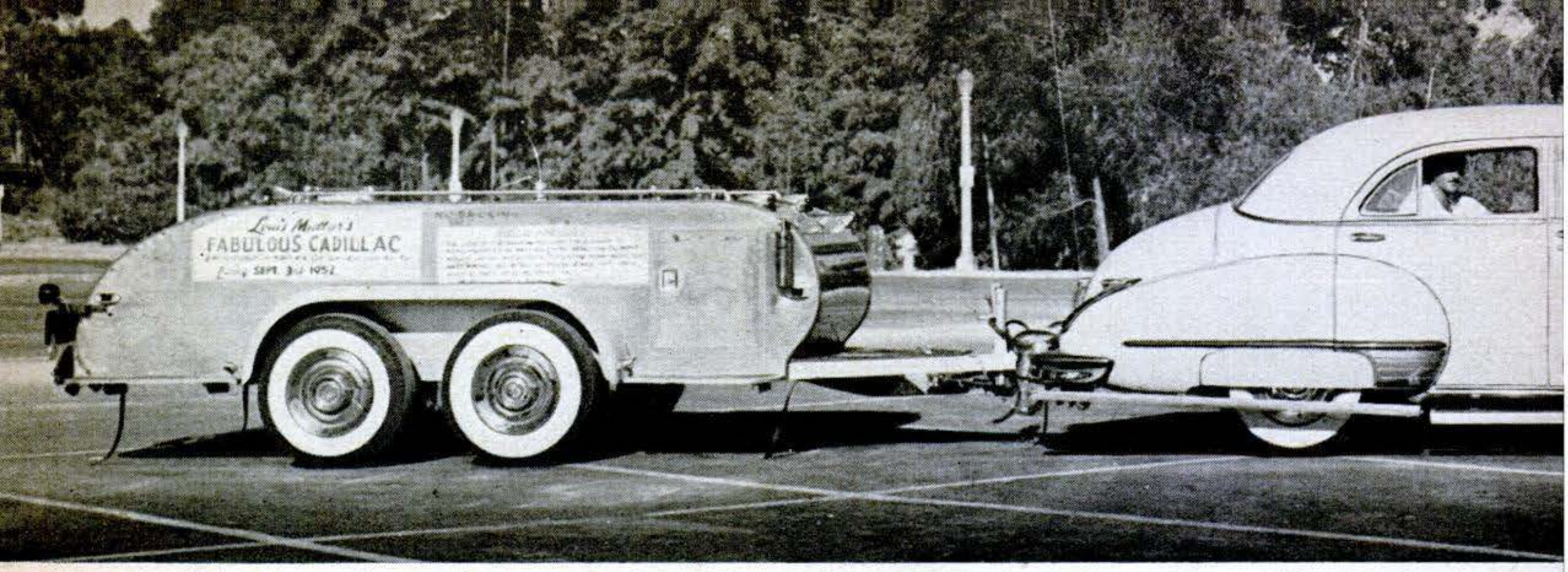


The fabulous sedan-trailer rig in San Diego, from which it ran nonstop to New York.

Cadillac Refuels on Run

Californian's automobile Pullman rolls 3,500 miles to New York in

THREE Californians recently made the dream of most drivers come true. They drove 3,500 miles without once stopping for traffic lights, gasoline, tolls or flat tires.

At three a.m. on Sept. 23, almost 90 hours from the time it pulled its aluminum-sheathed trailer onto the highway at San Diego, a sleek 1947 Cadillac crossed the George Washington Bridge. In New York it circled slowly while cameras clicked.

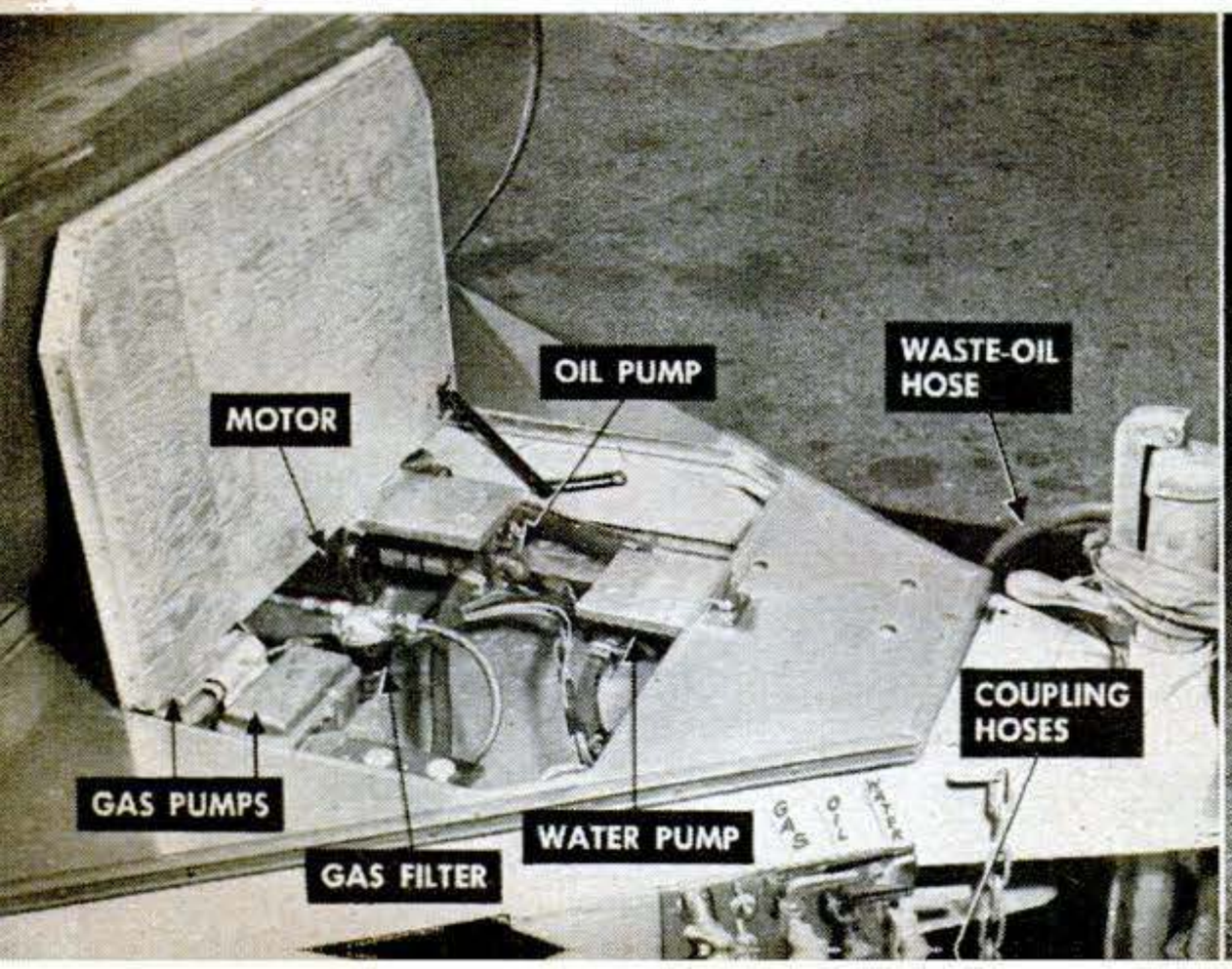
POPULAR SCIENCE MONTHLY staff members, previously in touch with the car by radio-phone, were told by the three tired but happy men aboard, "We just kept on. Everything worked fine." Five minutes later they started the non-stop trip back, never having set foot to pavement. Less than a week from the start, they finally stopped—home.

Louie Mattar, owner of the car, originally fitted it with running water, a lavatory and cooking facilities as a hobby (PSM, May '52, p. 130). For the nonstop trip, he had to add a 230-gallon tank trailer.

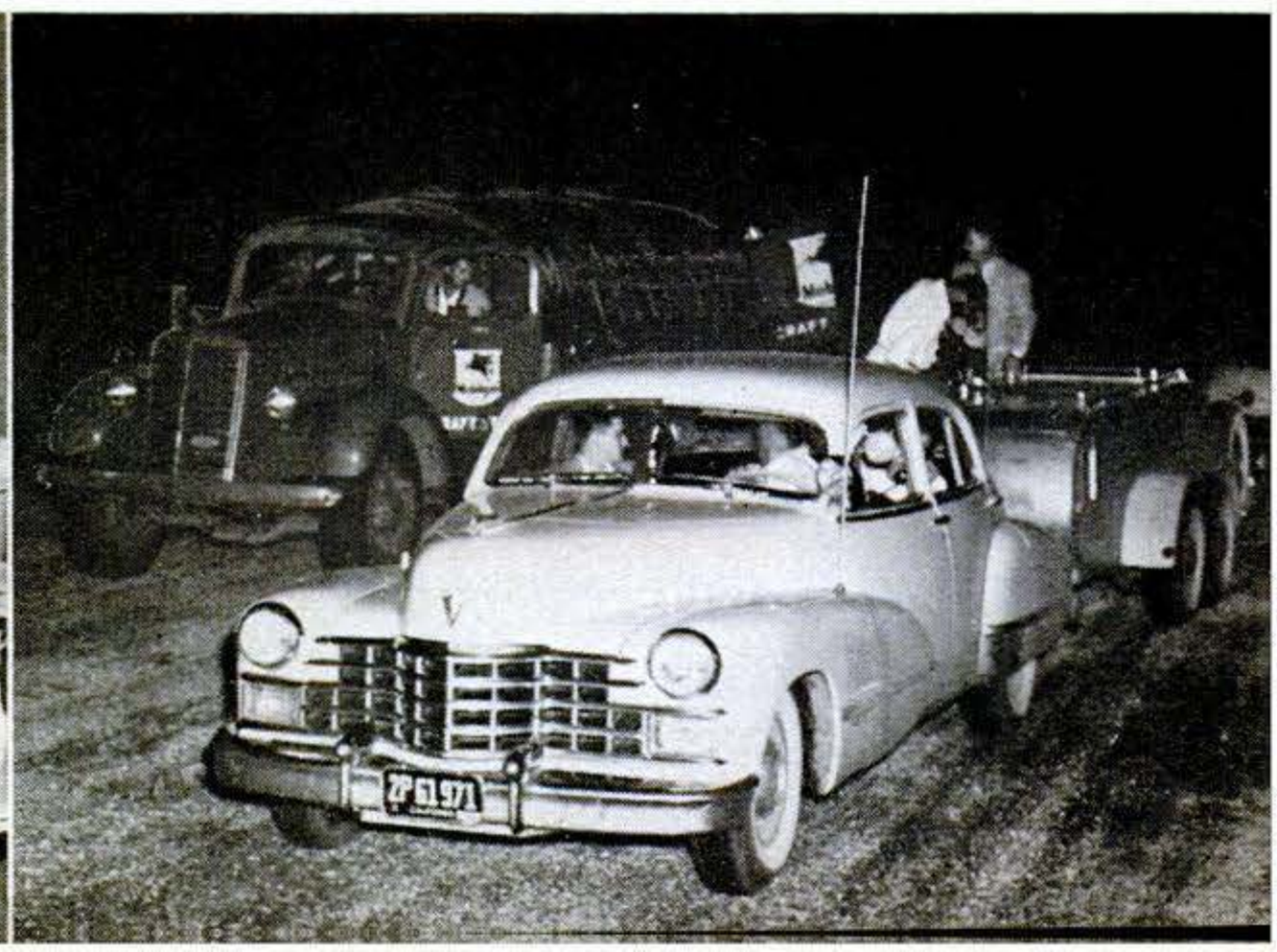
The car has water tanks under both bumpers, two 600-ampere-hour truck batteries, an extra spark coil, condenser and fuel pump. There's an air compressor, too, and means for changing engine oil and spray-cooling the radiator, tires and brakes at the touch of a button.

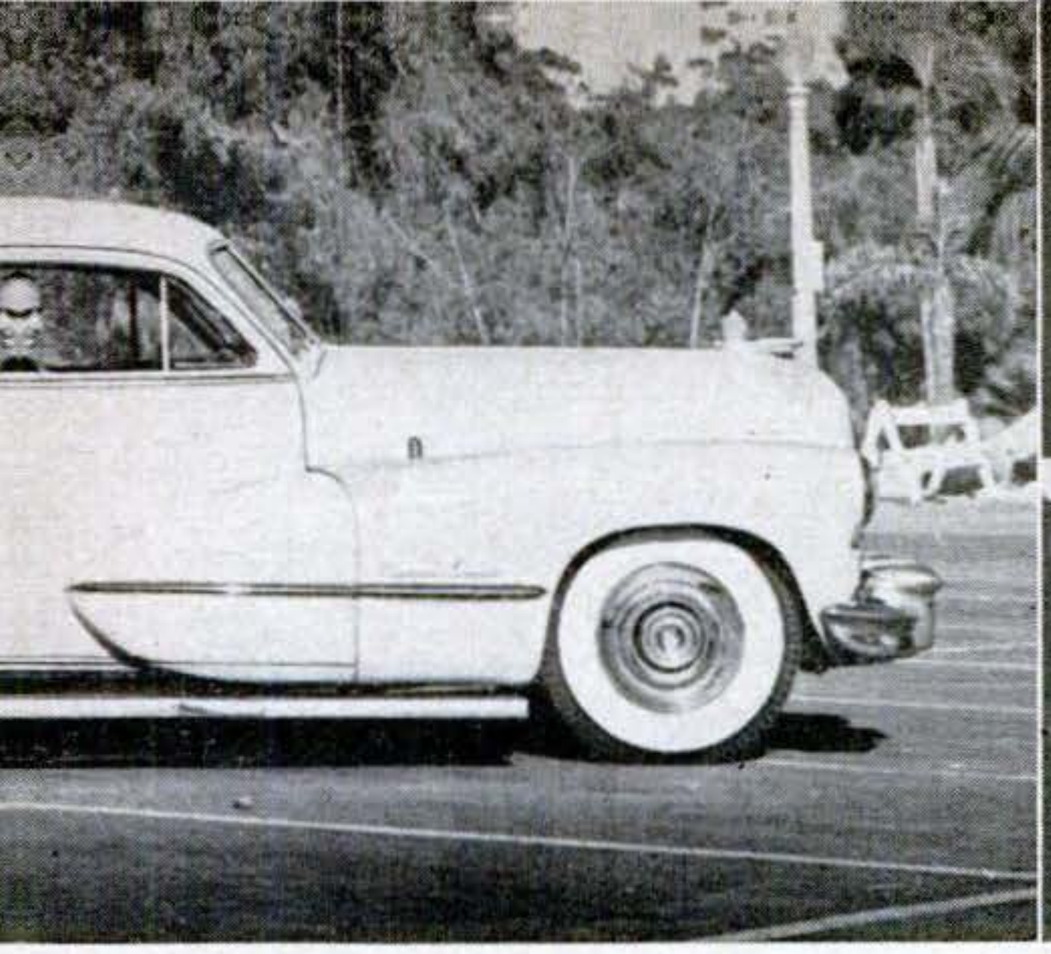
With him were Ernie Bashara and Joe Mitchell. Police clearance, checked by radiophone from the car, helped get through congested areas. A truck ran alongside to refuel the trailer at Kansas City, Mo., and Camden, N. J., on the journey east.

PUMP COMPARTMENT in trailer tongue houses fuel, water and oil pumps controlled from dash. If both fuel pumps on engine were to fail, the two shown here could run the car.



REFUELING ON THE RUN at midnight, Mattar drives in slow circles at New Jersey airport as tank truck runs alongside. Fuel trailer is grounded to protect against static spark.



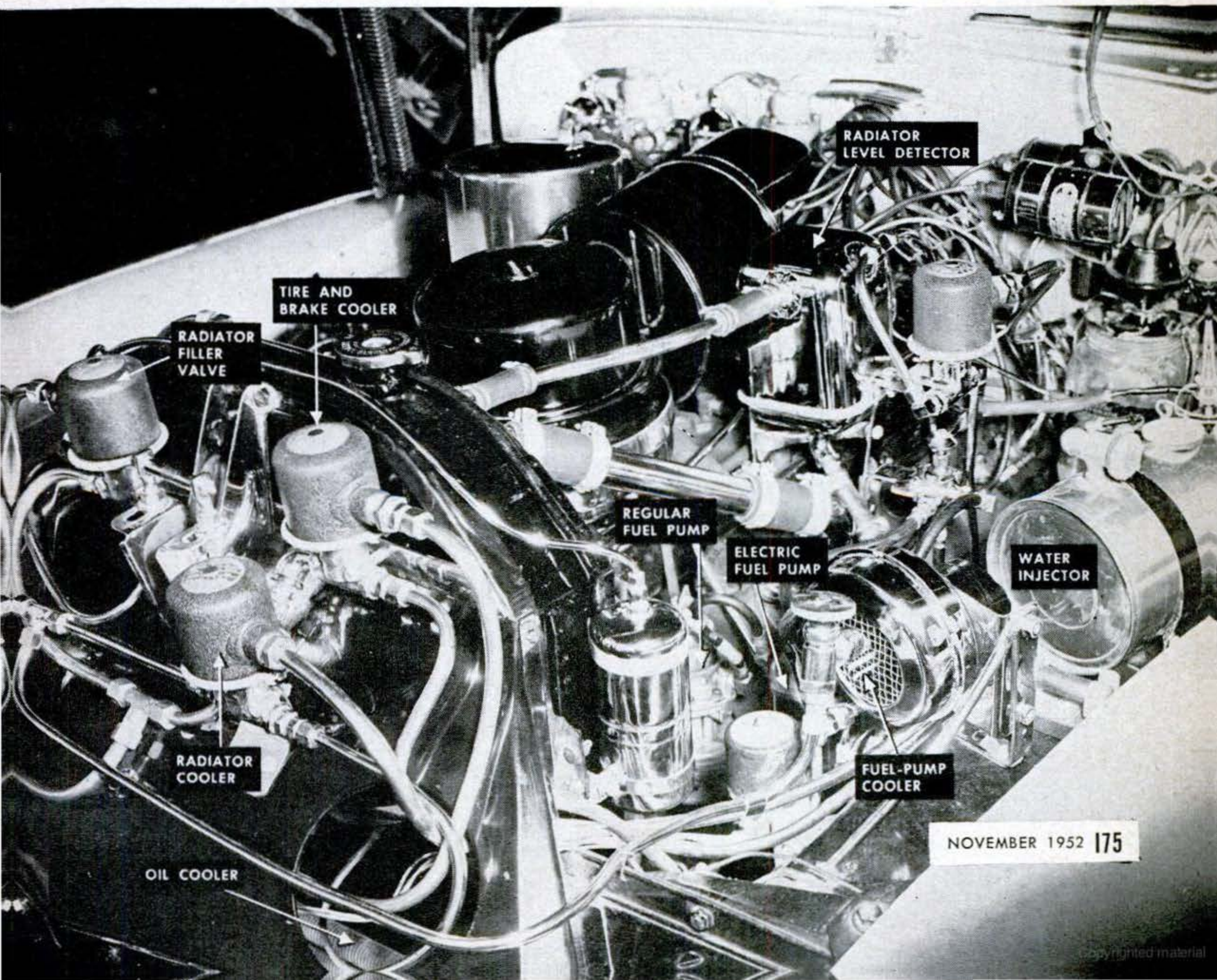


Driver pays George Washington Bridge toll as Mattar stands on retractable running board.

to Cross Country Nonstop

90 hours, towing 230-gallon tank trailer, also refilled on the run.

MECHANIC'S NO MAN'S LAND under hood includes solenoid valves to control sprays that cool radiator, tires and brakes; blower to balk vapor lock in fuel pumps, and a compressor that can pump up tires through air passages in axles. Thermostatic valve bypasses engine oil through finned cooler when hot. Air scoop cools silicone-insulated 60-amp. generator.



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P.S.

Last minute news & notes...

SOLDIERS WON'T CATCH COLDS aboard the new U.S. troop-transport ship Geiger, if a novel experiment is successful. A liquid cold-germ killer called triethylene glycol will be vaporized and circulated through air-conditioning systems to all parts of the 17,000-ton vessel.

AN AUTOMATIC TRANSMISSION with eight speeds forward and two in reverse may appear in 1954 cars. The automobile industry is said to be developing it first for military vehicles.

TO KEEP BUGS OUT, makers are packaging cereal in boxes of insecticide-impregnated paper. The poison stops the bugs but doesn't harm the food.

A NEW LACQUER gives furniture and tool handles a tough plastic coat up to 25 times as thick as ordinary enamel. Its extreme clarity and resistance to yellowing with age make it especially suitable for the high-quality blond woods that are popular in modern furniture, report chemists of the Tennessee Eastman Co., Kingsport, Tenn., who developed it.

CRISSCROSS AIRPORT RUNWAYS, for use according to wind direction, are on the way out. Modern planes land safely in cross winds, making such runways obsolete--so steps are being taken to carry out the President's Airport Commission's recommendation of space-conserving parallel runways at major air fields.

CAMPERS may now purchase a nine-pound food kit measuring only 13 by 11 by three inches, and containing everything to satisfy a man-size appetite for four days, with meat at every meal. The waterproof Kamp-Pack keeps food fresh without refrigeration in airtight envelopes lined with metal foil.

TOOTHACHE may be caused by too much selenium in the soil, say researchers at Oregon State College, who have found that selenium concentration is high in counties that report the worst teeth. (In the opposite way, a high fluorine concentration protects teeth.) Selenium was known to poison cattle that grazed on lands containing much of it, but its effect on humans is only now being learned.

THE FAMILIAR 630 TV CHASSIS is now available with a built-in tunable booster (Mattison TV & Radio Corp., NYC).

A PLASTIC DIE, replacing a steel one of four times its weight, now shapes steel panels for Dodge trucks in a standard 100-ton press. A boxing of boiler plate gives it the necessary impact resistance. Borrowing the idea from airplane-part makers, and applying it for the first time to production in the automotive industry, Dodge reports that a plastic die costs less than a steel one and can be made in a fraction of the time.

LARGEST BIRD that ever flew was a prehistoric vulture with a wing-spread believed to have been 16 to 17 feet. So says Dr. Hildegarde Howard of the Los Angeles County Museum, who recently unearthed a huge wrist bone of the species, new to science, in a Nevada cave.

DON'T BELIEVE IT, if someone tells you that putting nylon hose in a home freezer will make them wear longer. Nylon makers' tests show it's pure bunk, the Department of Agriculture reports.

WANT TALLER CORN next year? Then give the seeds a shot of terramycin, the antibiotic widely used against pneumonia and other diseases. Dr. Louis G. Nickell sprinkled his corn seeds with water containing .0007 ounces of terramycin per gallon. Four weeks later those plants were 3½ inches taller than untreated ones and weighed twice as much. Dr. Nickell also tried penicillin on radishes--makes 'em grow twice as big, he says.

The Editors

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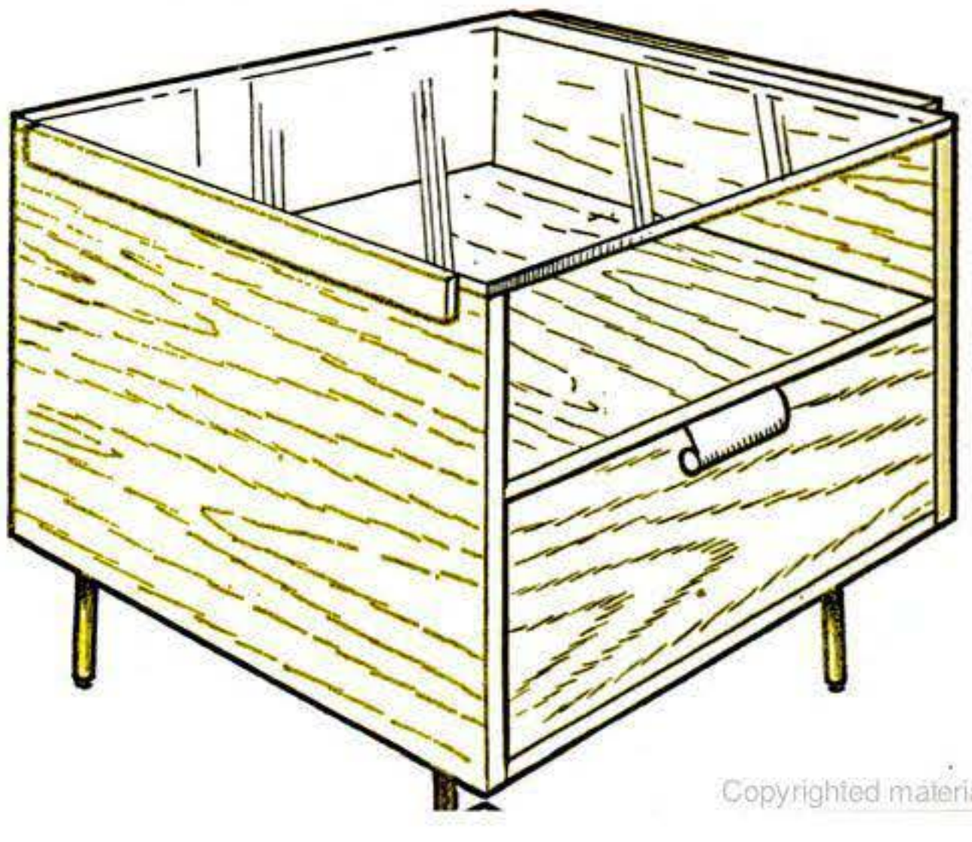
MECHANICS *and* HANDICRAFT
REG. U. S. PAT. OFF.

Modern Furniture

is easy to build with new plywood panels

EITHER of these modern tables is an easy week-end project.

Butt joints are used throughout to simplify the work. If you have your lumber dealer cut the parts to size, construction is little more than an assembly and finishing job. However, if you prefer to cut the stock yourself, the new Handy Panels are a natu-



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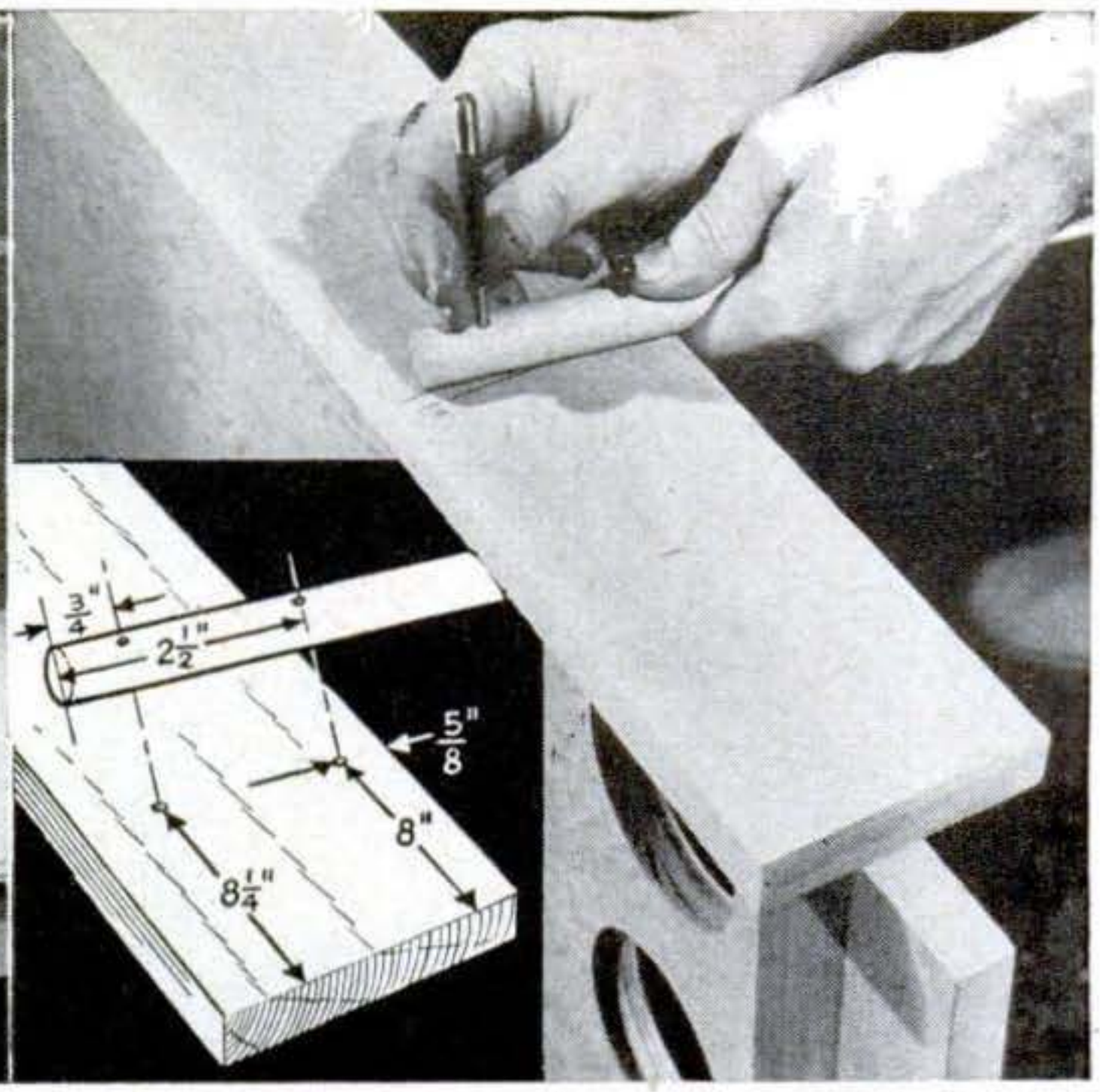
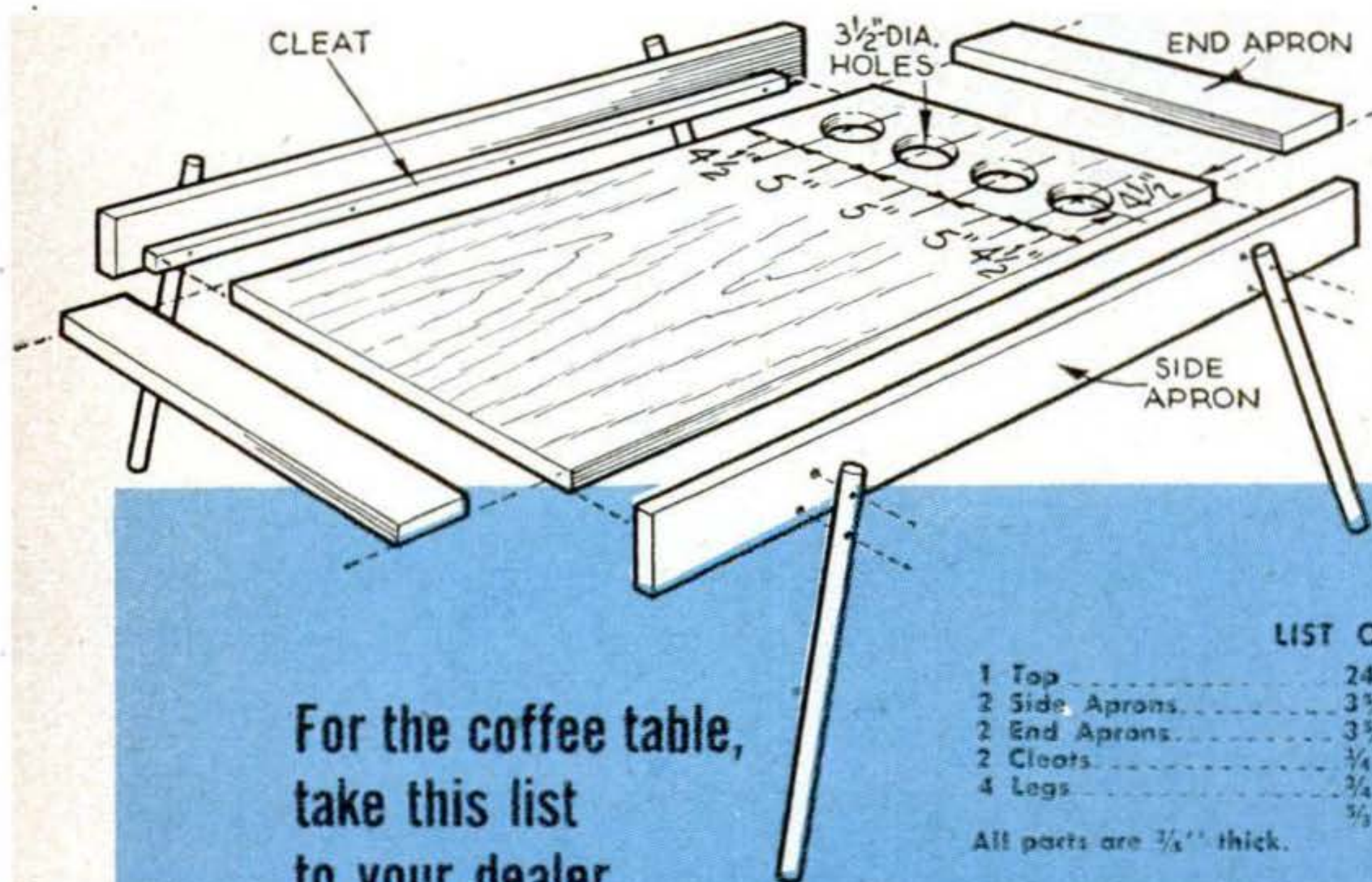
Screw-Fastened Joints and Outside Legs Simplify Coffee Table

END APRONS lap over edge of top by 1". Drill screw holes in top first. Then clamp top and aprons together and drill pilot holes 5/8" deep in aprons through those in the top.



LEGS ARE LOCATED as shown above. Drill pilot holes 5/8" deep and attach legs to side aprons with roundhead wood screws. Steel rod or pipe can be substituted for dowel legs.



COFFEE TABLE (left) and end table (opposite page) require only a few basic tools. Parts can be cut from new small plywood panels.

For the coffee table, take this list to your dealer

LIST OF PARTS

1 Top	24" by 48" fir plywood
2 Side Aprons	3 5/8" by 50" hardwood
2 End Aprons	3 5/8" by 24" hardwood
2 Cleats	3/4" by 48" hardwood
4 Legs	3/4" by 15" hardwood dowel, or 5/8" steel rod or pipe

All parts are 3/4" thick.

ral for the projects. These are panels of fir plywood, sold by hardware stores and lumberyards in various sizes and thicknesses, so that you needn't buy a big 4' by 8' panel.

The only part of the job that could be troublesome—straight saw cuts constitute most of the work—is forming the four big holes at one end of the coffee table. These can be omitted if you don't have facilities for cutting them neatly, but they are both decorative and handy for holding glasses or potted ivy.

Probably the best way of cutting them is with an expansive bit in a brace, or with a hole saw or fly cutter in the drill press. A router guided by a hardboard template would also produce a clean job.

Norman Cherner, a well known furniture designer, developed both of these pieces for the Douglas Fir Plywood Association.

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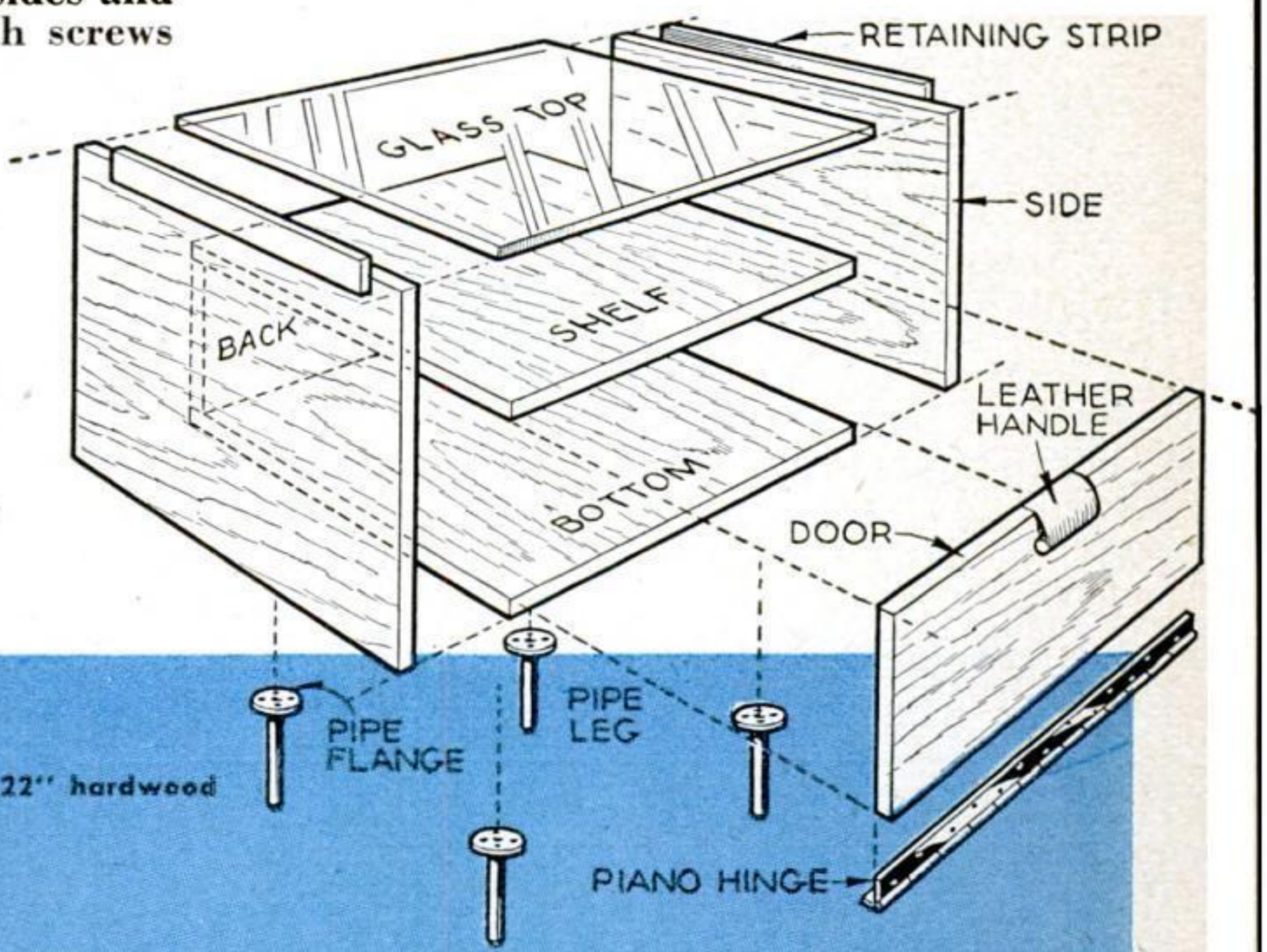
PIPE FLANGES that hold legs of end table are located 3″ in from edges of front, sides and back. Fasten flanges to bottom with screws after drilling pilot holes.

Glass-Topped End Table Has Magazine Shelf and Storage Space

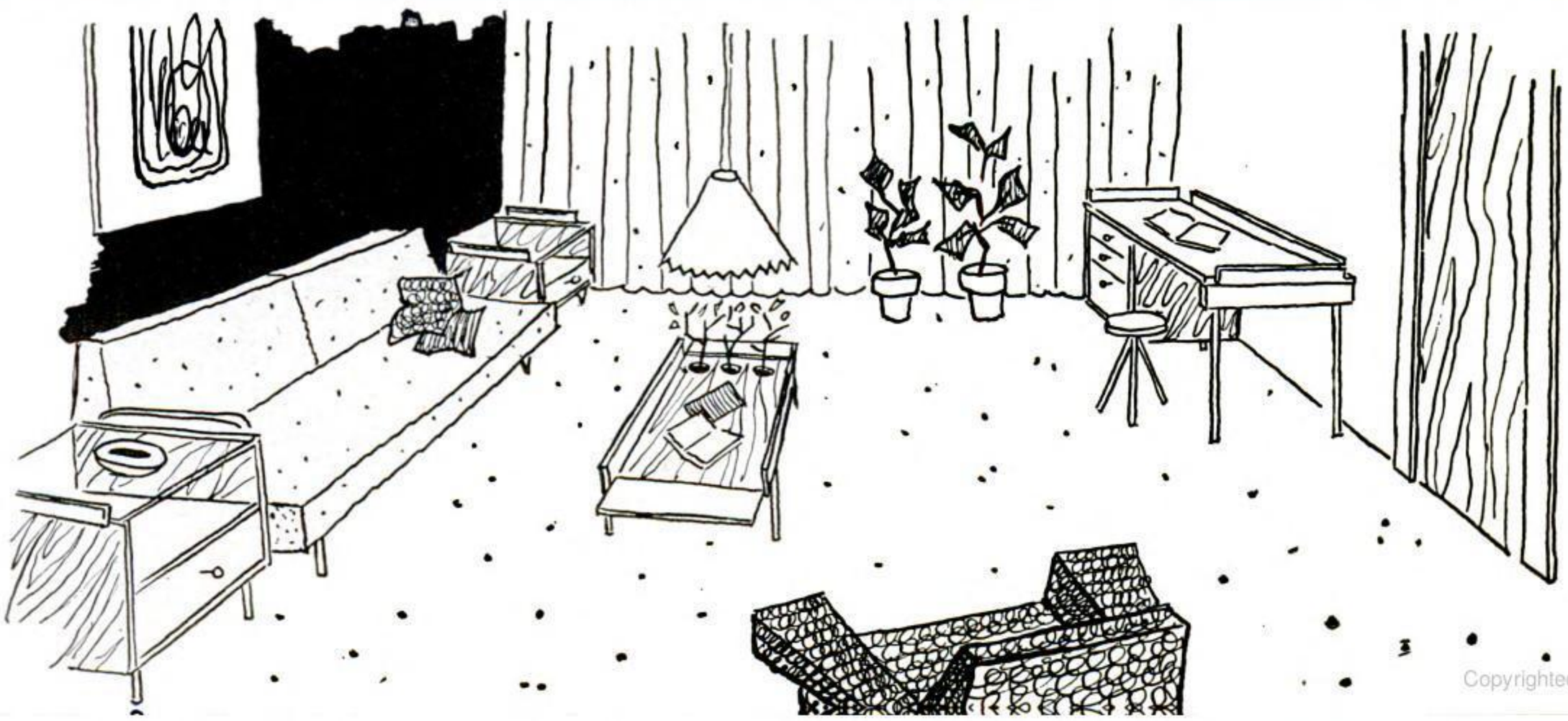


LIST OF PARTS

2	Retaining strips	¼″ by 1″ by 22″ hardwood
2	Sides	16″ by 24″
1	Door	8″ by 24″
1	Back	8¼″ by 24″
1	Shelf	24″ by 24″
1	Bottom	24″ by 24″
1	Plate-glass top	¼″ by 24″ by 25½″
1	Piano hinge	24″ long, with screws
4	Pipe legs	½″ by 6½″, threaded, with flanges and screws

All wood parts, except retaining strips, are ¾″ fir plywood.

For the end table, take this list to your dealer



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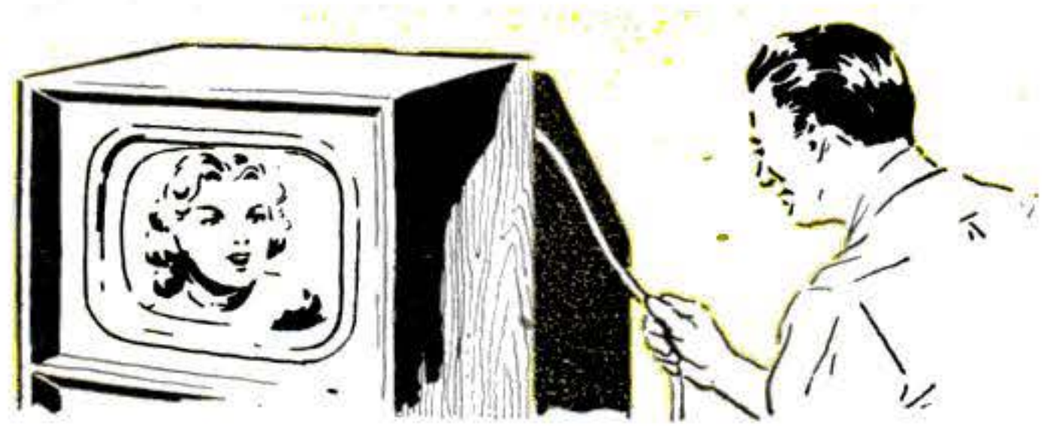
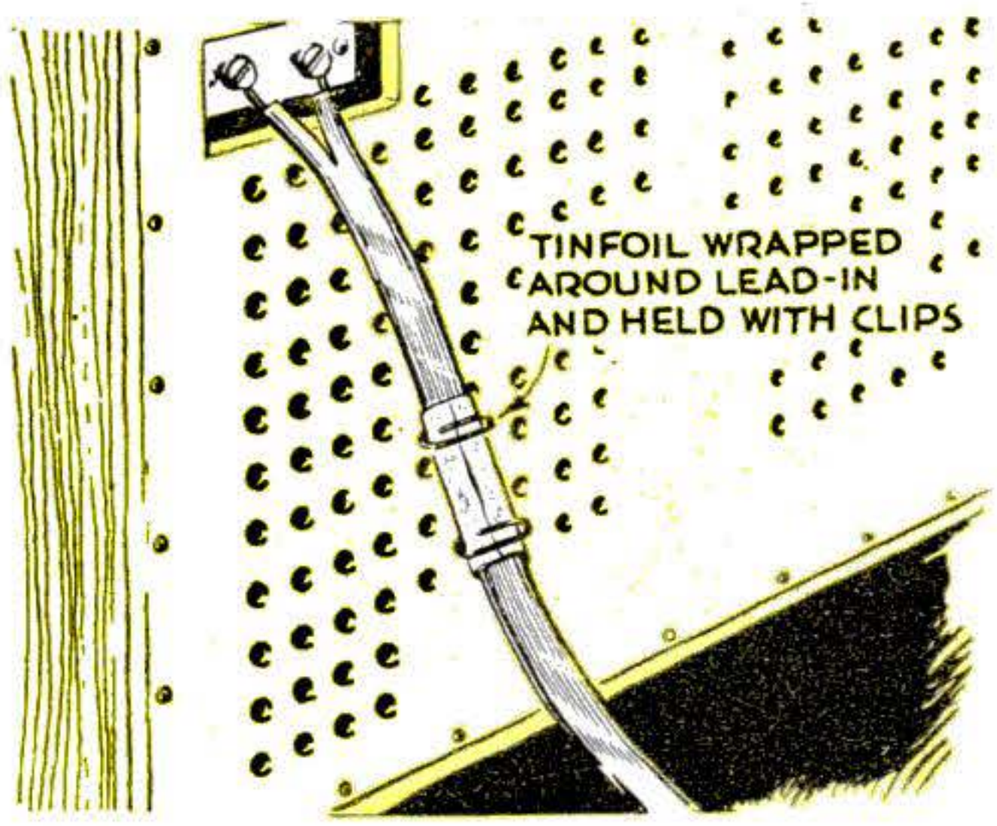
How to Improve a

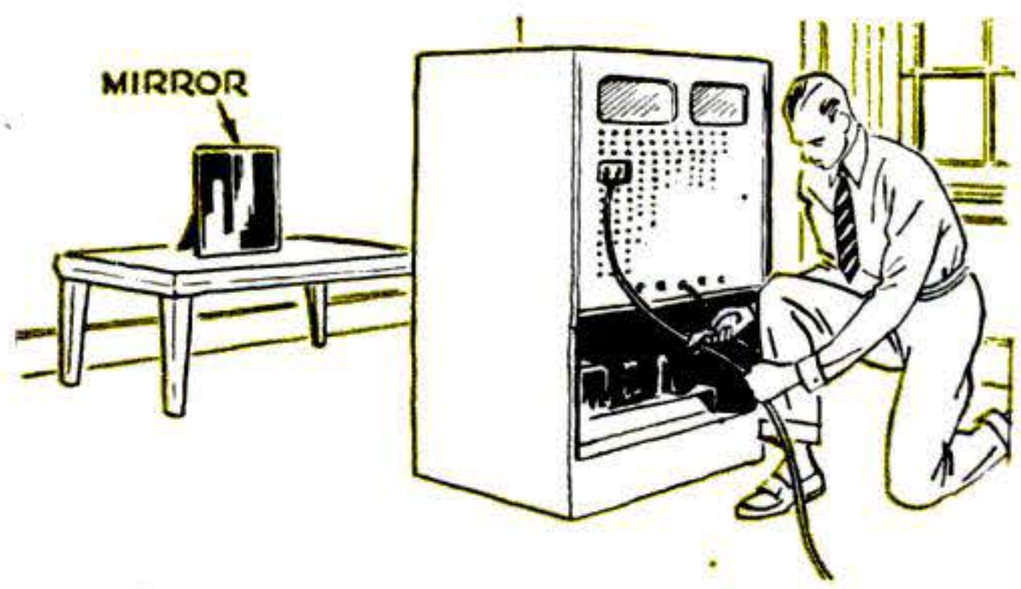
Even though you are happy with your set's performance, chances



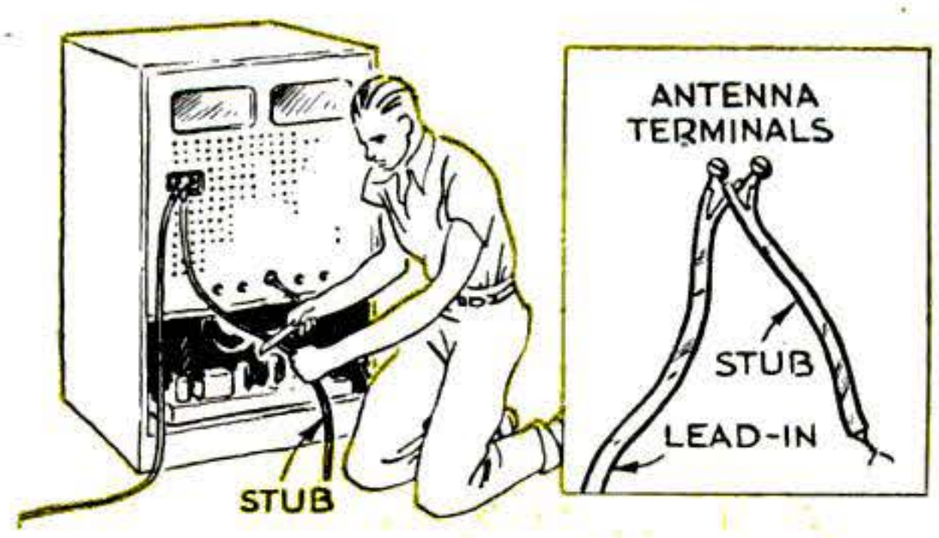
Tuning lead-in may help. If yours is the flat plastic-covered lead-in called ribbon or 300-ohm twin-lead, you can quickly find out whether tuning will make an improvement. Run your hand up and down the wire for six feet or so from the set. If picture brightens or becomes clearer, one or several of the following stunts will keep it that way:



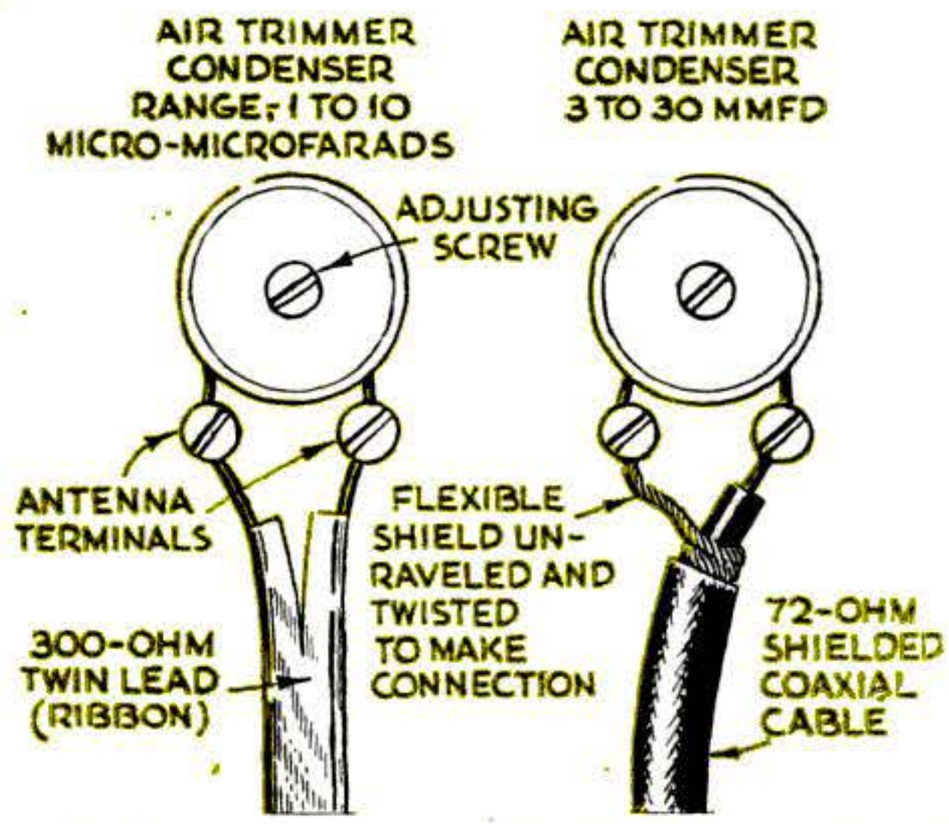
Tinfoil treatment. Wrap a 4" square of metal foil (cigarette wrapping will do) around the lead-in wire and slide it slowly back and forth. Fasten the tinfoil in place with tape or paper clips at the point on the wire where the picture is best.



Prune the lead-in. If it's longer than necessary and the excess is coiled up behind the set, straighten it out and run your hand along it until picture brightens. About 6" toward the set from this point cut the wire and reconnect it to the antenna terminals. Try the hand test again and if the picture shows no change, the job is complete. Otherwise snip off a bit more wire and test again. Watch the progress of the tests through a mirror placed in front of the television set.



Add a shorted stub. Connect a 4' piece of lead-in to the antenna terminals without removing regular lead-in, and tune set to weakest channel. Dig a knife or razor blade into the extra lead near its end to cut through the insulation and touch both wires. Do this every ½" or so, working toward set. Where picture is brightest, cut off excess wire and twist exposed ends together. To keep the stub out of the way, tack it to the cabinet, but don't roll it up.



Install a condenser. Purchase one of the two kinds of variable condensers illustrated according to your lead-in type. Connect the condenser across the antenna terminals without removing the lead-in and adjust with a small screwdriver to brighten picture.

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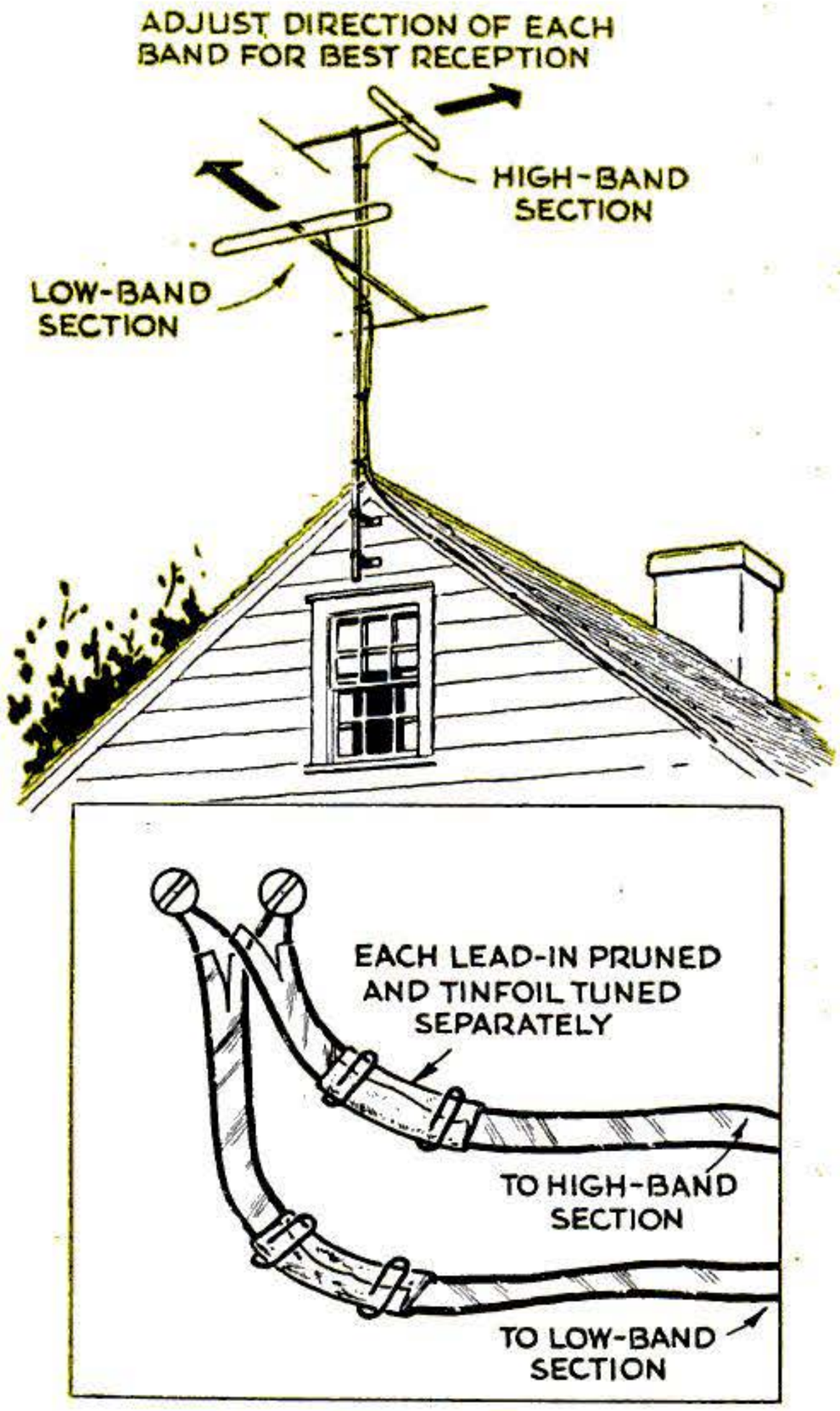
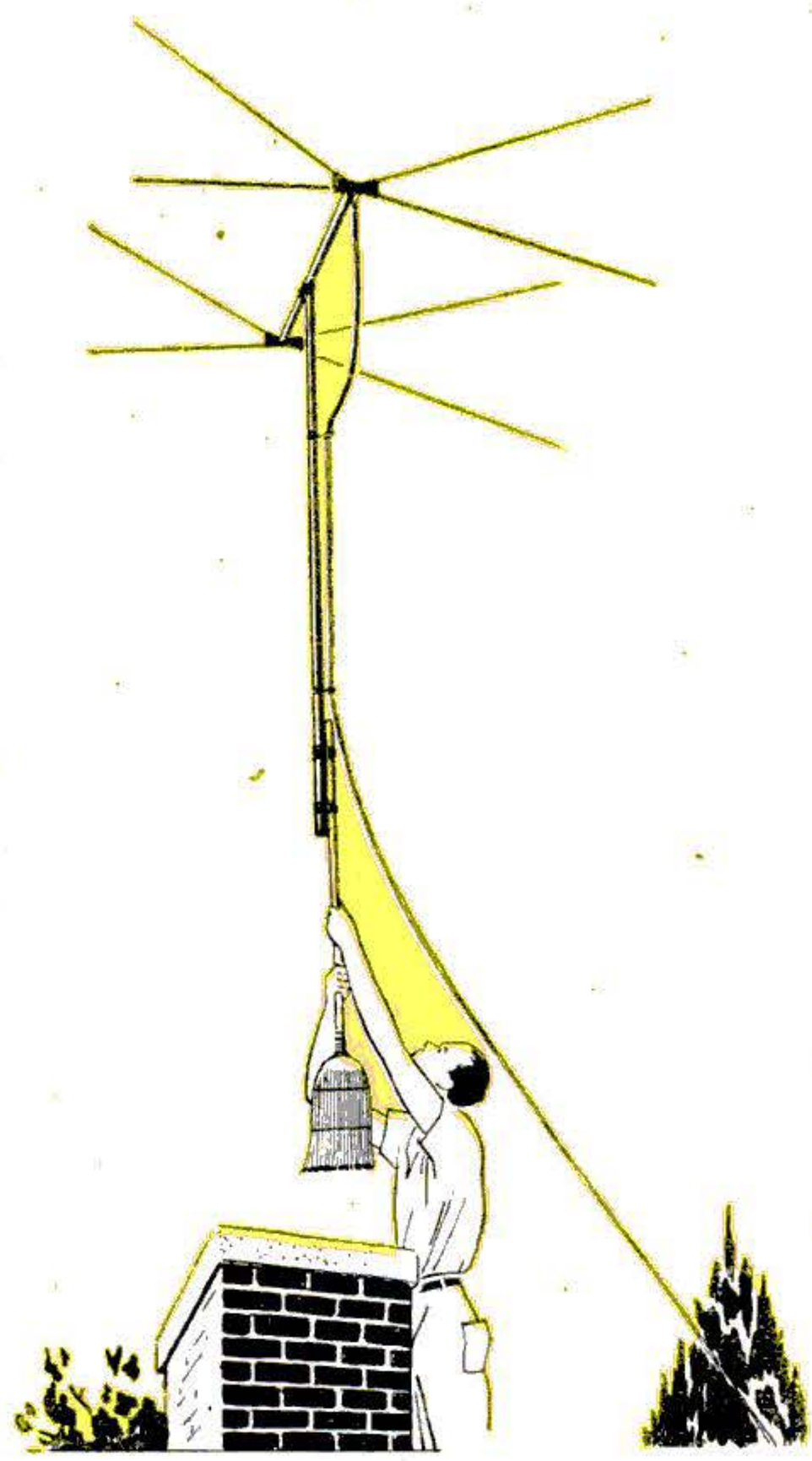
Good TV Picture

are you can make it do better. Here's how.

By John B. Ledbetter
Engineer, WKRC-TV





Check antenna direction. Tune in weakest channel and rotate antenna slowly, first in one direction, then the other. Have a friend watch the picture and call out instructions. If yours is a two-band antenna, adjust the larger section first for best reception on low channels, then small section for high channels. Try running separate leads from each section to the set. These should be joined at the set, or you can connect them to a special double-pole double-throw switch, made for the purpose, that will let you select either band.

Raising or lowering antenna. This can bring about a tremendous change in the picture. Mount it temporarily on a long stick or broom handle and raise it slowly as high as you can; then lower it and compare the results. Somewhere within that 10′ or 15′ difference in height is the ideal spot for the antenna. Sometimes a complete change of location will catch a signal that barely reached the antenna before. Be sure to check all the channels before securing the antenna as you may have to compromise on its final position.

Rain wash out the picture? If the picture is fine in good weather but poor when it rains, clean the antenna terminals and plastic insulator between them with soap and water and a stiff brush. A heavy collection of soot on this area can ruin reception in rainy or even damp weather.

Please turn the page for more TV hints.

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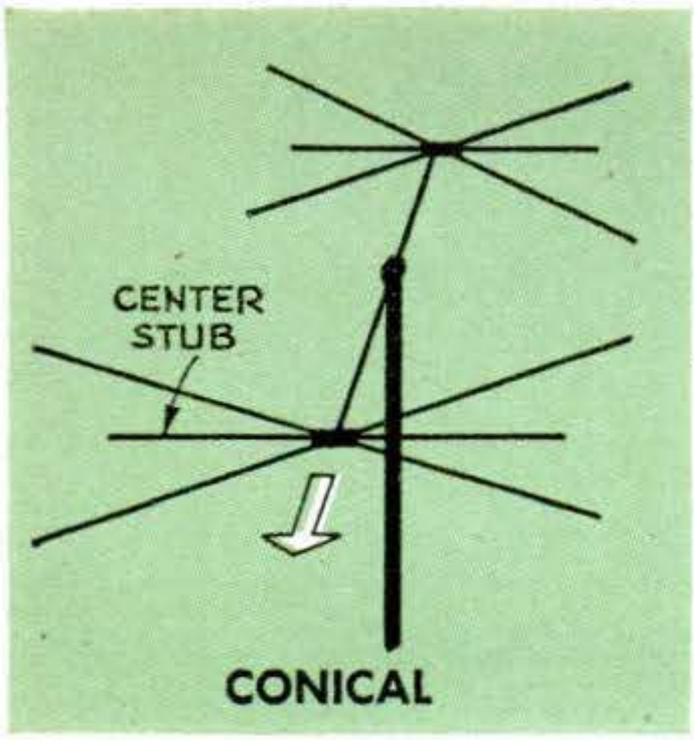
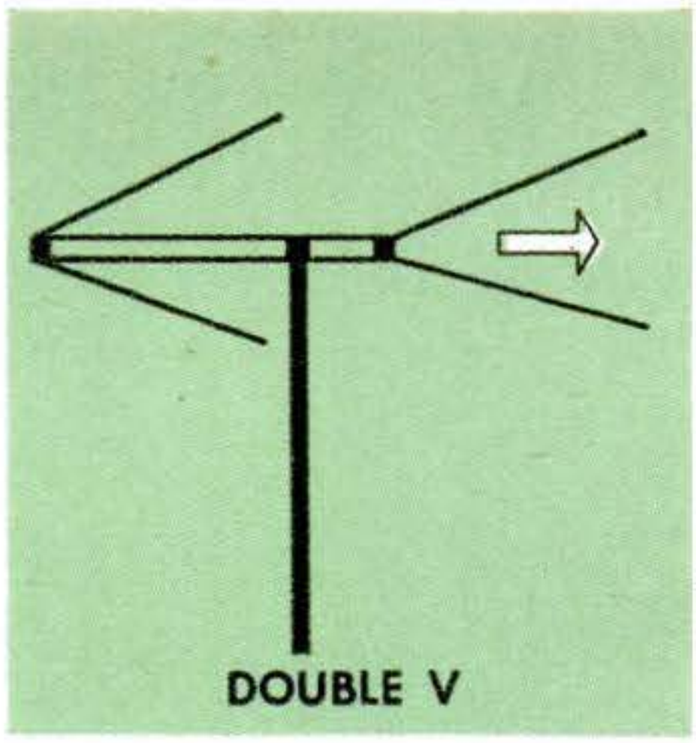
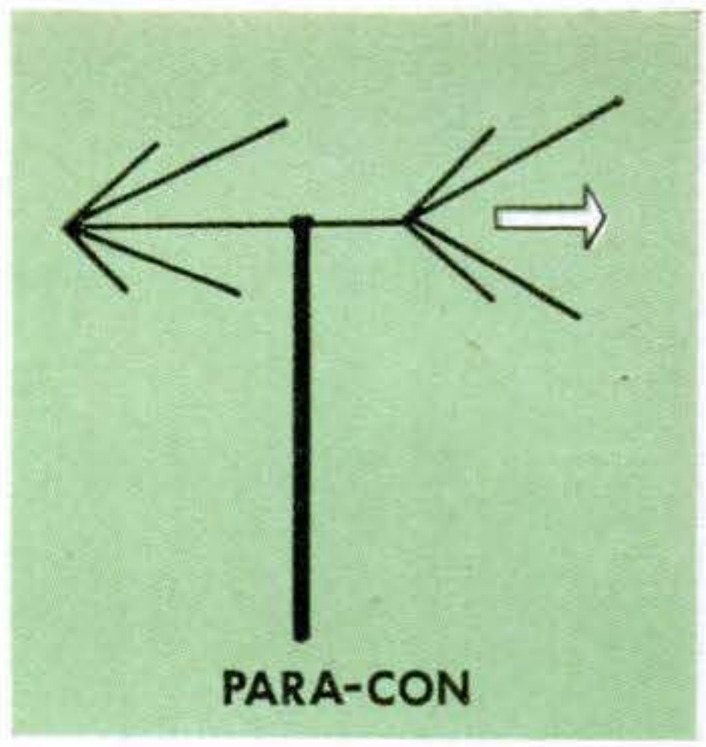
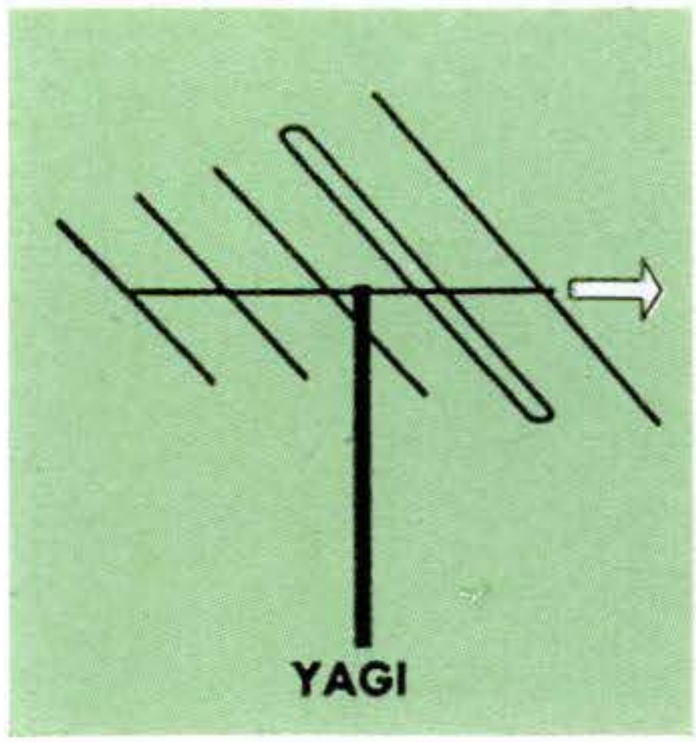
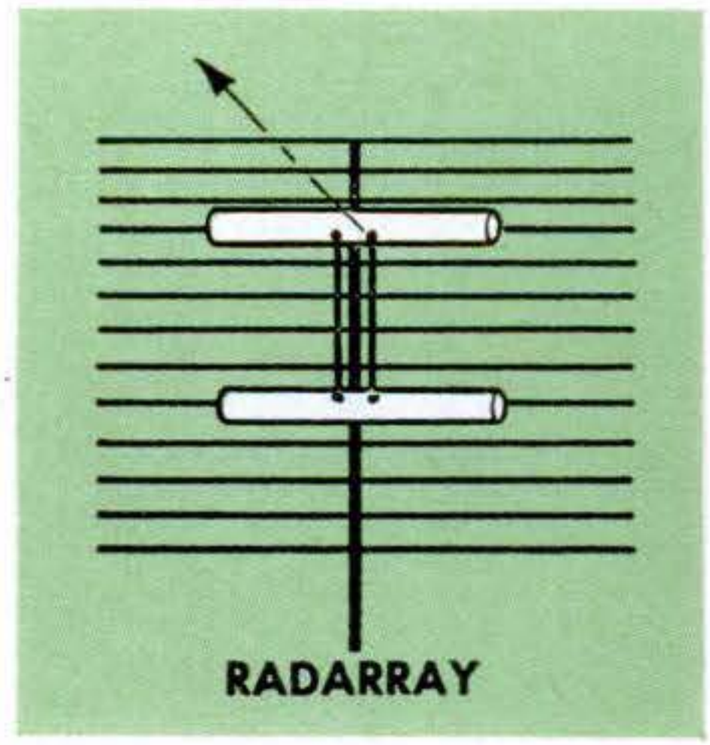


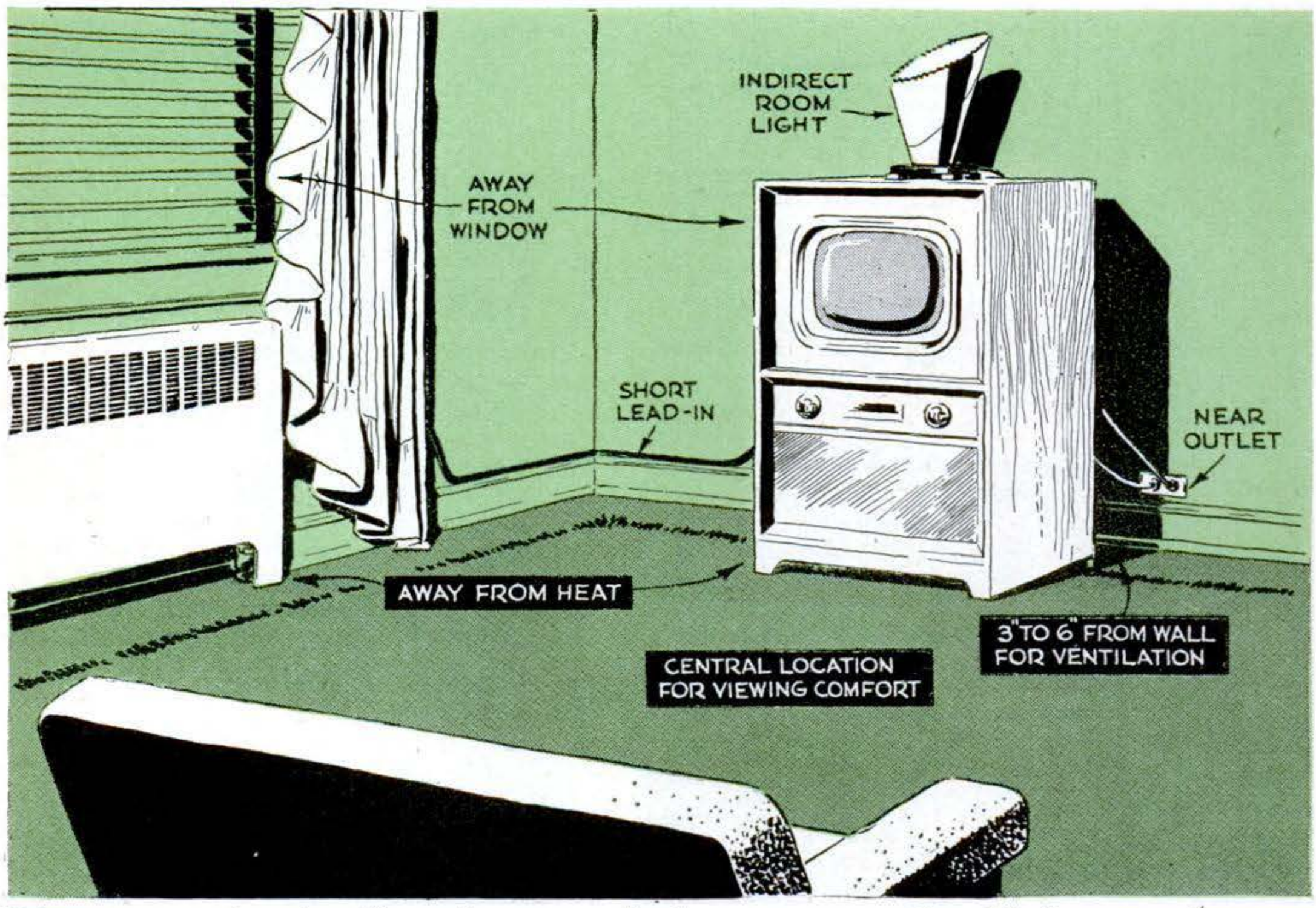




Replace antenna completely. The low cost of a new, more efficient type of antenna suggests that it might be wise to toss the old one out and take a fresh approach. Those sketched represent the cream of the current crop of antenna designs. Conical and double-vee are best for city locations. Yagi or radarray will bring in a fringe-area signal that is too weak for others.







Points to remember. Avoid heat, dampness and bright light from window. Keep set away from wall so air can circulate around tubes, keeping them cool. Place set near outlet and keep lead-in short. Group furniture 6′ to 12′ from set to lessen eyestrain. Turn blind up to reduce sunlight to half for daytime viewing; light room evenly with indirect light at night. Older persons who wear bifocals may need special lenses for TV viewing.

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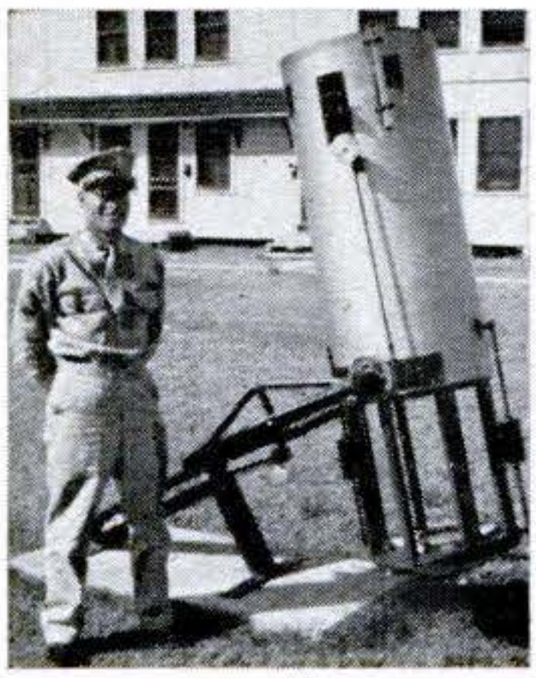
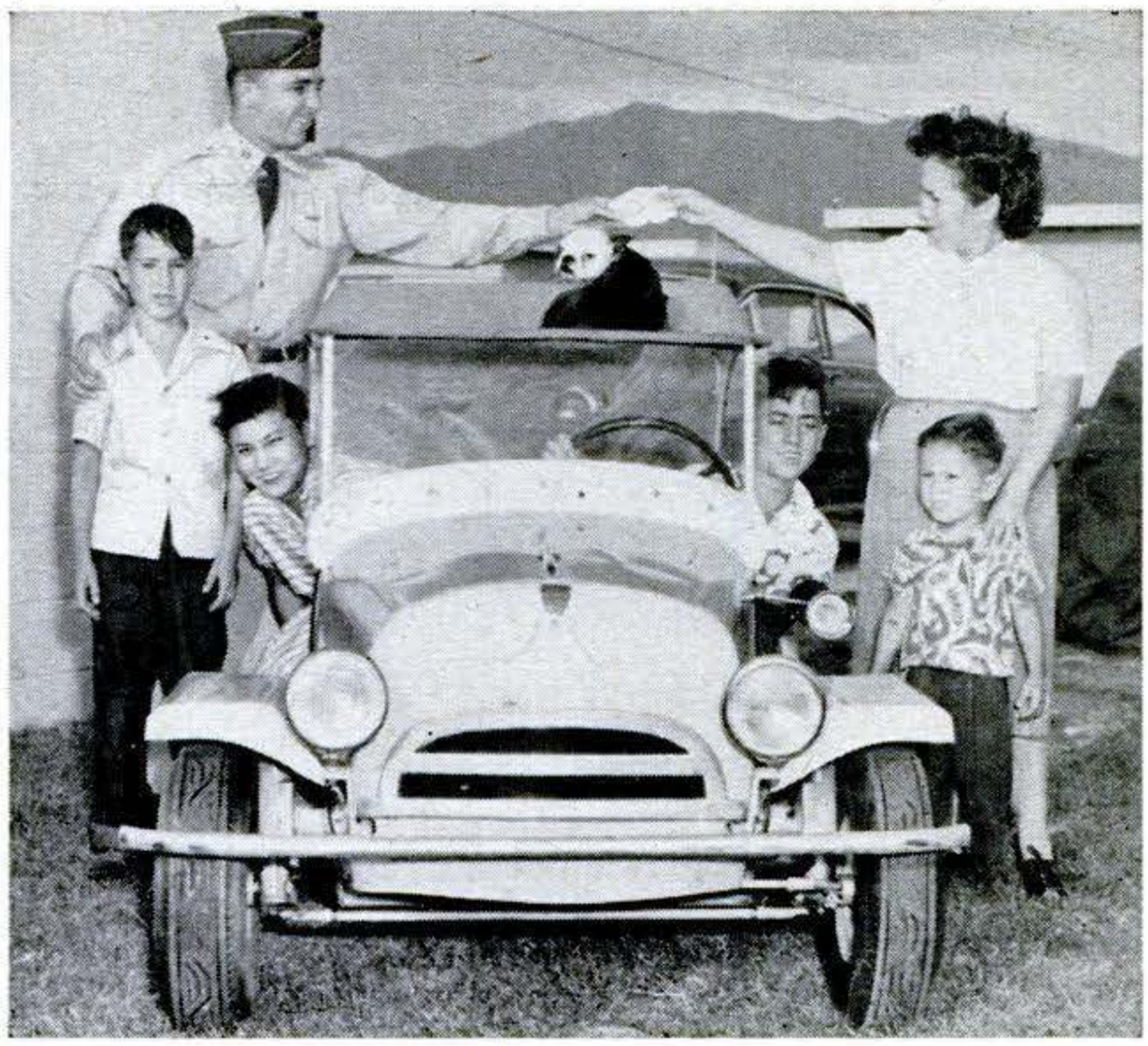


SGT. VORHIES posed beside the prize-winning telescope at Kirtland AFB, where he was stationed when he submitted his entry.



KING MIDGET was received by Mrs. Vorhies at Albuquerque along with congratulations from Capt. Frank L. Kennedy, Kirtland Air Force Base Special Services Officer. Vorhies children are, left to right: Jimmie, Marjorie, Donald and Aaron. That's Stubbie on top of car.

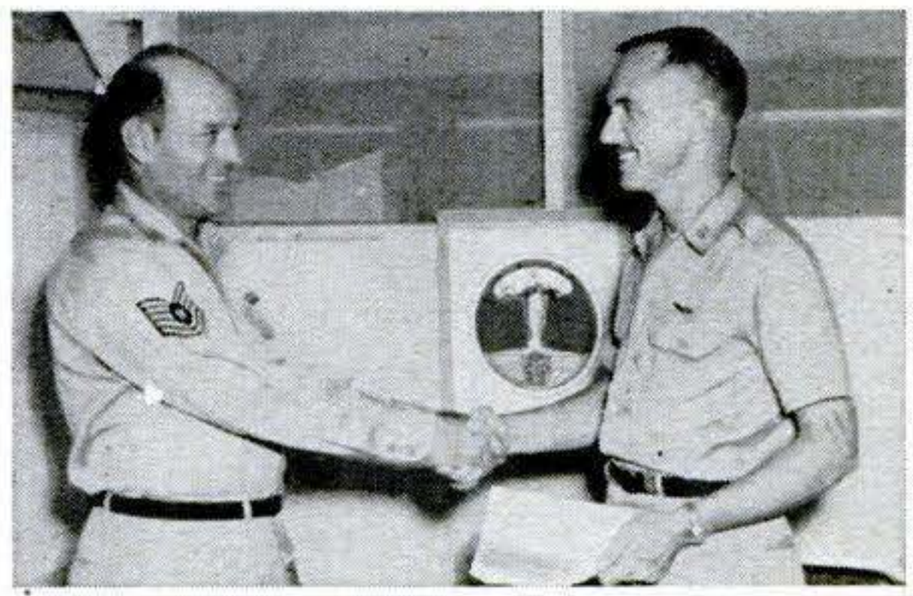
CRAFTSMEN IN UNIFORM

New car is delivered to contest winner's wife in Albuquerque, N. M.

FIRST prize—a King Midget auto—in PSM's Craftsmen in Uniform contest went to T/Sgt. Donald A. Vorhies of the Air Force, a career soldier whose personnel file bulges with official commendations for his inventions. He holds the Legion of Merit award. The sergeant designs with his hands: "I build it first, then make the drawings," he says.

The winning entry was a 15″ reflecting telescope, completely homemade, including all optical parts. Since the sergeant is now stationed at Kwajalein, near the Pacific atom-bomb testing area, the car was delivered to his wife at their Albuquerque, N. M., home.

Sergeant Vorhies holds 57 patents, including one for a machine for changing bomber tires that is said to have saved nearly a million dollars a year during World War II.



PSM RADIOGRAM notified Sgt. Vorhies at Kwajalein that he won first prize. Capt. James E. Campbell, squadron adjutant, offers congratulations.

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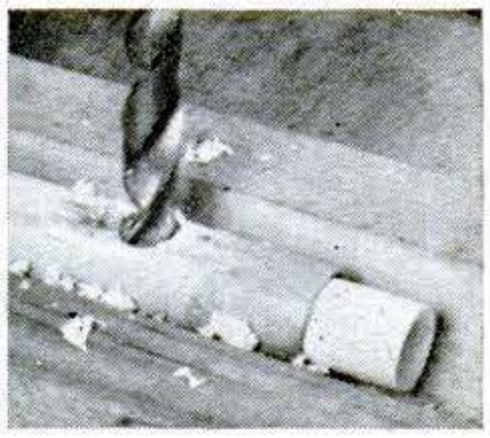
Small Mirror Aids Small Fry

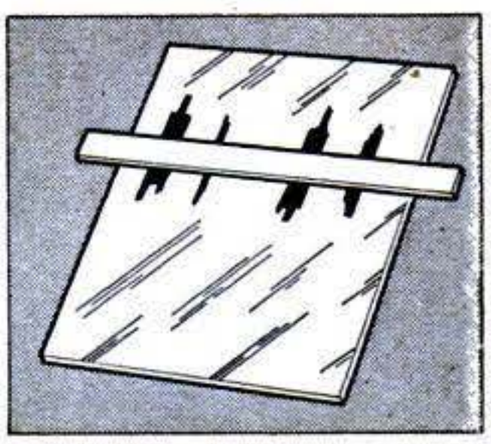
A RECTANGULAR mirror cemented low on a bathroom wall is handy for children. Small scraps of mirror can be bought at a glass store. Have the edges ground to remove sharp corners. Mount it on a tile wall with linoleum paste. After the child has outgrown the mirror, it can be broken loose and the paste dissolved with warm water.—*Karl Greif, Norwich, N. Y.*

Tubing Drilled Over a Dowel



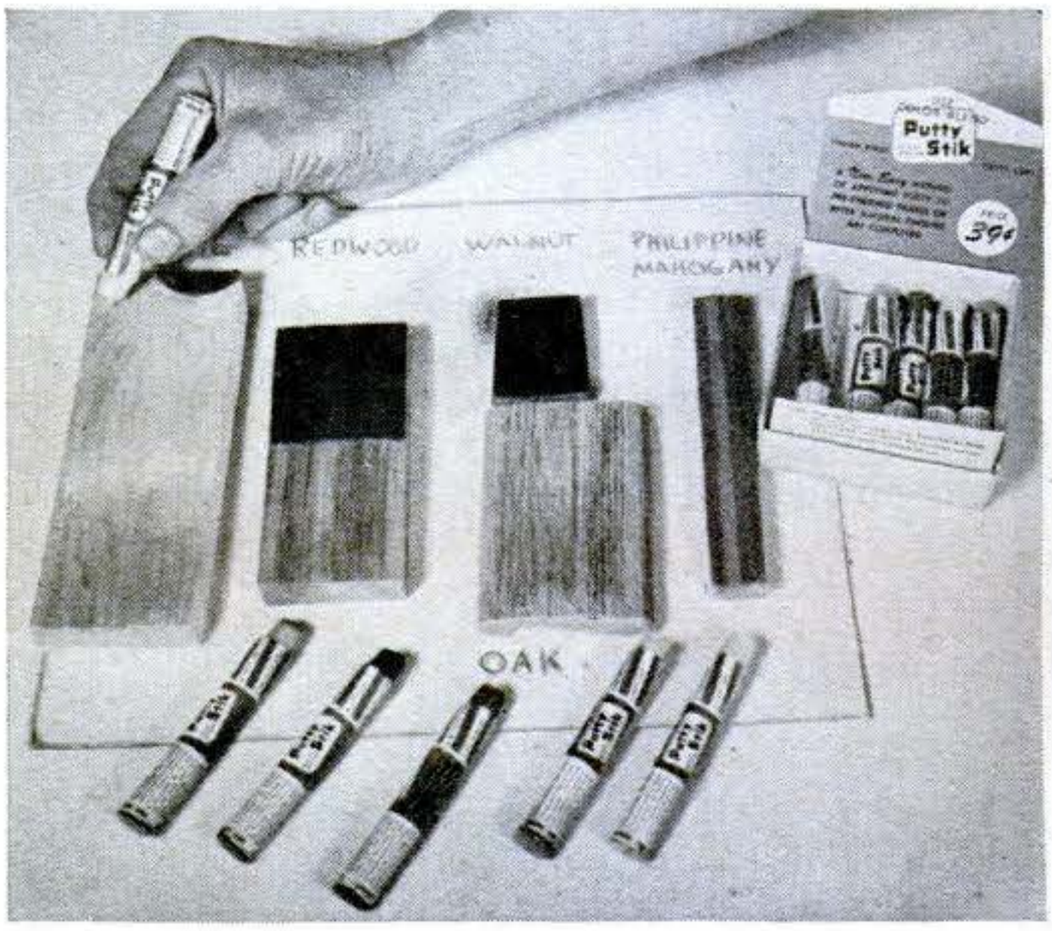
TO DRILL large holes in thin-wall tubing without collapsing it, insert a dowel in the tubing. Place the tubing and dowel in a V block, prick-punch the tubing and then drill it. The dowel acts as a handle, too, when you are drilling short pieces of tubing.—*Walter Haase, Hartford, Conn.*

Wax Crayon Aids Glass Cutting



WHEN you use a rule or straightedge as a guide for cutting glass, make heavy marks with a wax crayon on the glass. The wax on the glass will provide friction to keep the rule from slipping as you use the cutter.—*H. E. Moody, Upper Jay, N.Y.*

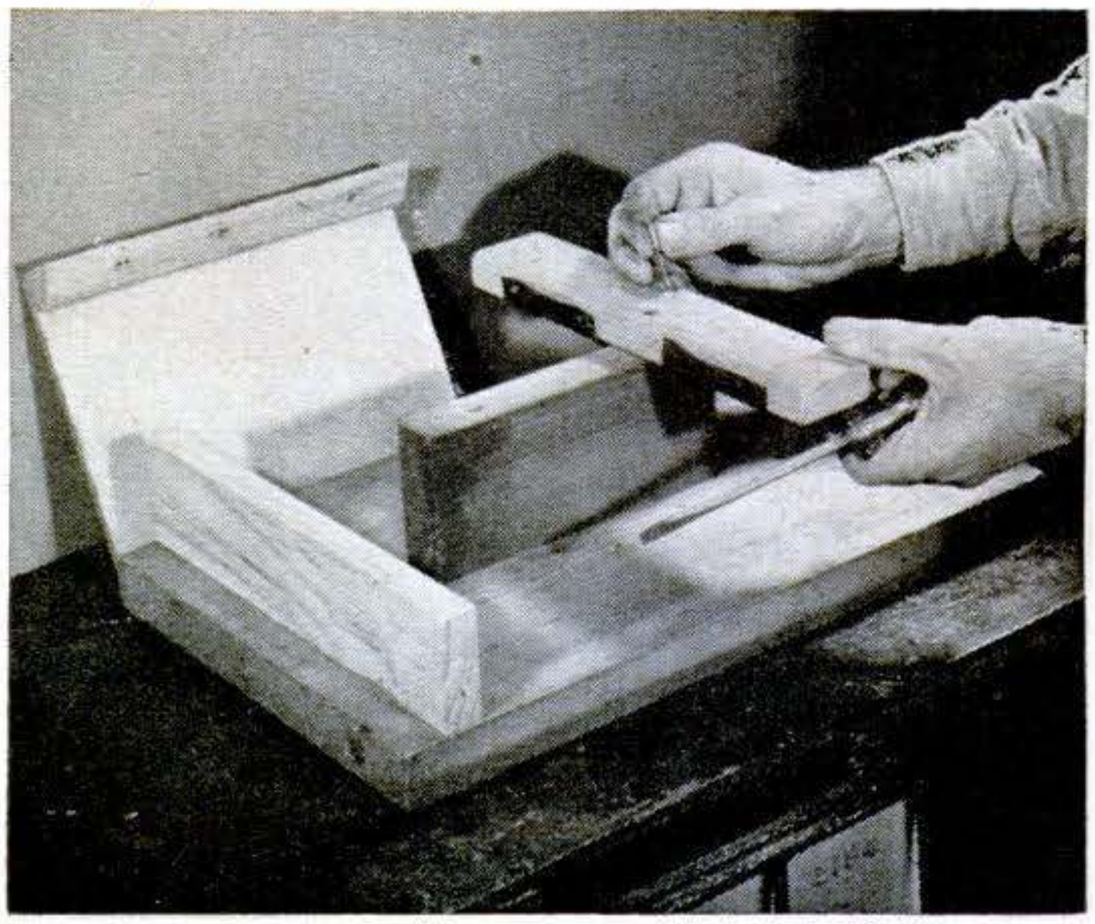
Wood Filler Goes Over Finish



UNLIKE most other wood fillers, Putty Stik can be used to fill cracks and nail holes after lacquer or another natural finish has been applied to furniture or woodwork. To use, you select one of seven shades and rub the tip of the stick in the hole or crack. Forest Interiors Manufacturing Co., 1218 E. Cherry St., Seattle 22, makes it.

Rack Stores Boots on Ceiling, Prevents Creasing

A SIMPLE rack like this stores rubber boots upside down, keeping the uppers from bending and creasing. Repeated creasing may damage the rubber. The upside-down position also keeps dirt out. Almost any kind of scrap stock can be used, of dimensions to suit the boots. Five pieces are needed. In the photo at right, the toe cleat is being attached with screws. I mounted my rack on the basement ceiling.—*Walter E. Burton, Akron.*



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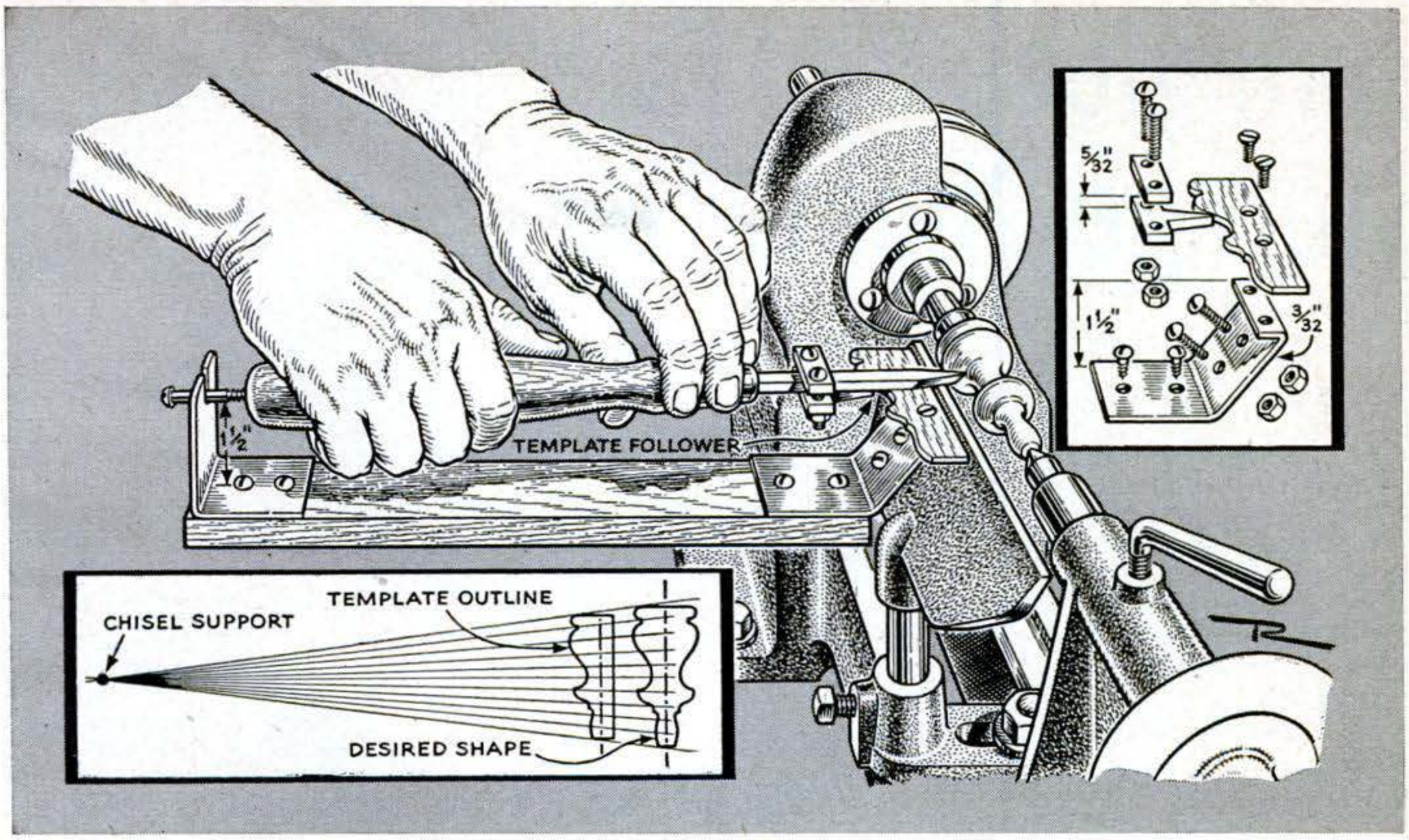

Template Jig Mounted on Lathe Duplicates Turnings

FREEHAND lathe turning of duplicate pieces—chess men for example—is a real test of a woodworker's ability. With the help of this template jig, though, even a novice can produce identical turnings with ease.

The jig mounts on the lathe tool rest, making use of the height and lateral adjustments. It guides the chisel with hairline accuracy, and even locates the handle for you to duplicate the cutting angle. It consists of a hardwood strip, about as long as a turning chisel, fitted with two brass brackets. One bracket is fastened to the tool rest, and the other supports a wood screw projecting from the chisel handle.

The template follower, shaped like the chisel point, is clamped to the shank of the chisel. A plywood template for the workpiece is screwed to the front bracket. The template shape must be developed as shown in the inset, as the chisel handle remains in one position while the point swings in an arc to follow the template contour.—*Helmut Meyer, Bremen, Germany.*

Primer Rustproofs Fasteners

DIPPING plated parts in rust-sealing primer will make them last longer. For dipping, you may have to add thinner or place the can in a pan of hot water. (Never heat the can on a stove.) After the primer has dried, you can apply paint for maximum protection.—*C. L. Allison, Cadillac, Mich.*

Cleaning Soldered Joints

I FIND it convenient to keep a bottle of alcohol and a bottle of liquid soap with my soldering equipment. The alcohol removes residue from rosin-core solder while the soap cleans the surface and prevents future corrosion on an acid-flux joint.—*Will Thomas, Webster, N.Y.*

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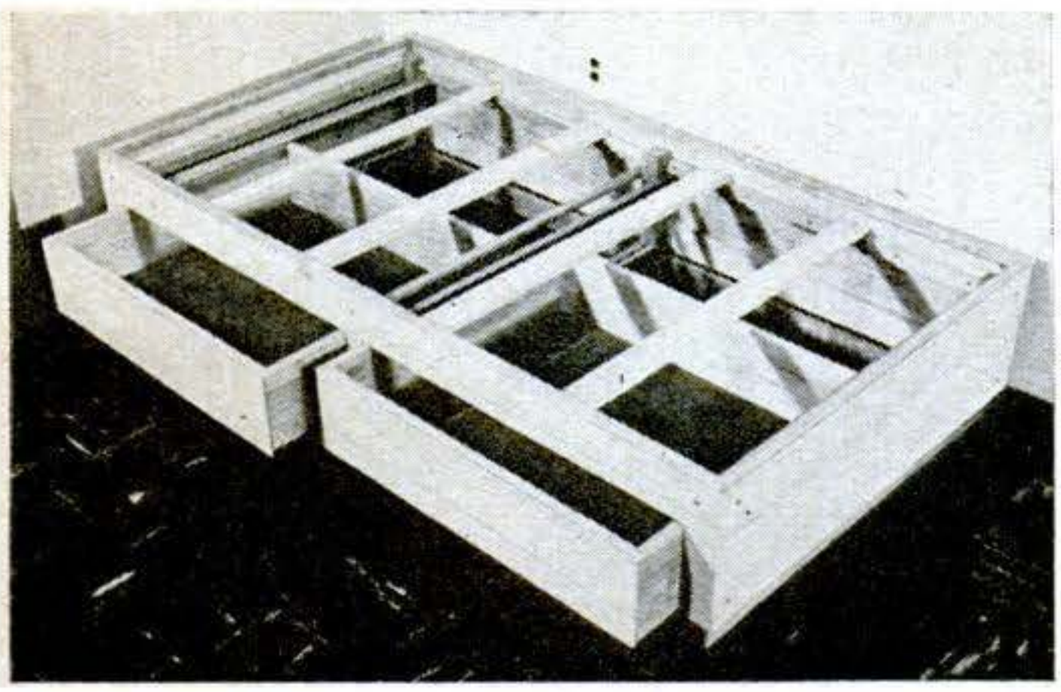
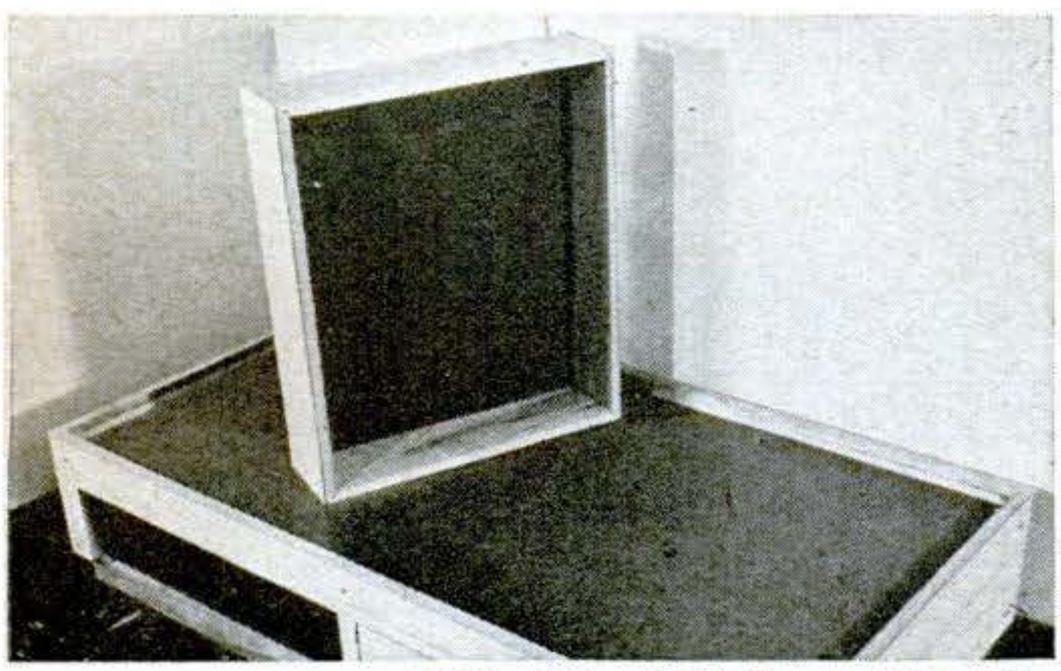
Springless Bed Is Storage Chest, Too

BLANKETS, toys and other articles are neatly hidden in two large drawers that are themselves almost invisible. Mattress rests directly on composition-board support. Clean, modern facing of combed plywood, glued and screwed on, conceals joints, is hard to mar.

No room for a bogeyman under this bed—its two large drawers will keep your belongings hidden neatly out of the way.



SIMPLE BED FRAME is made of inexpensive pine except for birch kick plate and hardwood legs. Runners guide drawers at both top and bottom to keep them from tilting forward.



BIG DRAWERS are 28″ wide, 23″ deep, 8″ high. Hand grips under fronts eliminate shin-skinning knobs. Composition board for mattress floor and drawers is strong, easy to clean.

THIS handsome storage bed will comfortably stow not only one growing youngster but a considerable number of the things that go with him. It has wide, deep drawers that occupy the usually wasted space underneath.

Either end can be used as the head, and the drawers can be made to open from either side. The low height, 16¼″, will also save wear and tear on overactive adventurers who tend to get off course during the night and roll out. And the combed-plywood facing easily hides the dents and scratches of small housewreckers.

The bed's space-giving secret lies in its elimination of a spring—the mattress rests right on a sheet of 5/16″ composition board. If your children are as springy as mine, they will find this soft enough. If they want more bounce to the pounce, you can substitute a flat link spring for the board.

Making the frame. I designed mine around a standard twin-bed mattress, but you can alter the dimensions to suit any mattress you may have. The six legs are 2″-square hardwood, 14″ long and rabbeted to take the 3″-high birch kick plate. If you add ball-bearing casters to the legs—which should then be slightly shorter—the daily chore of making up the bed will be much easier. Glue and screw the stringers and

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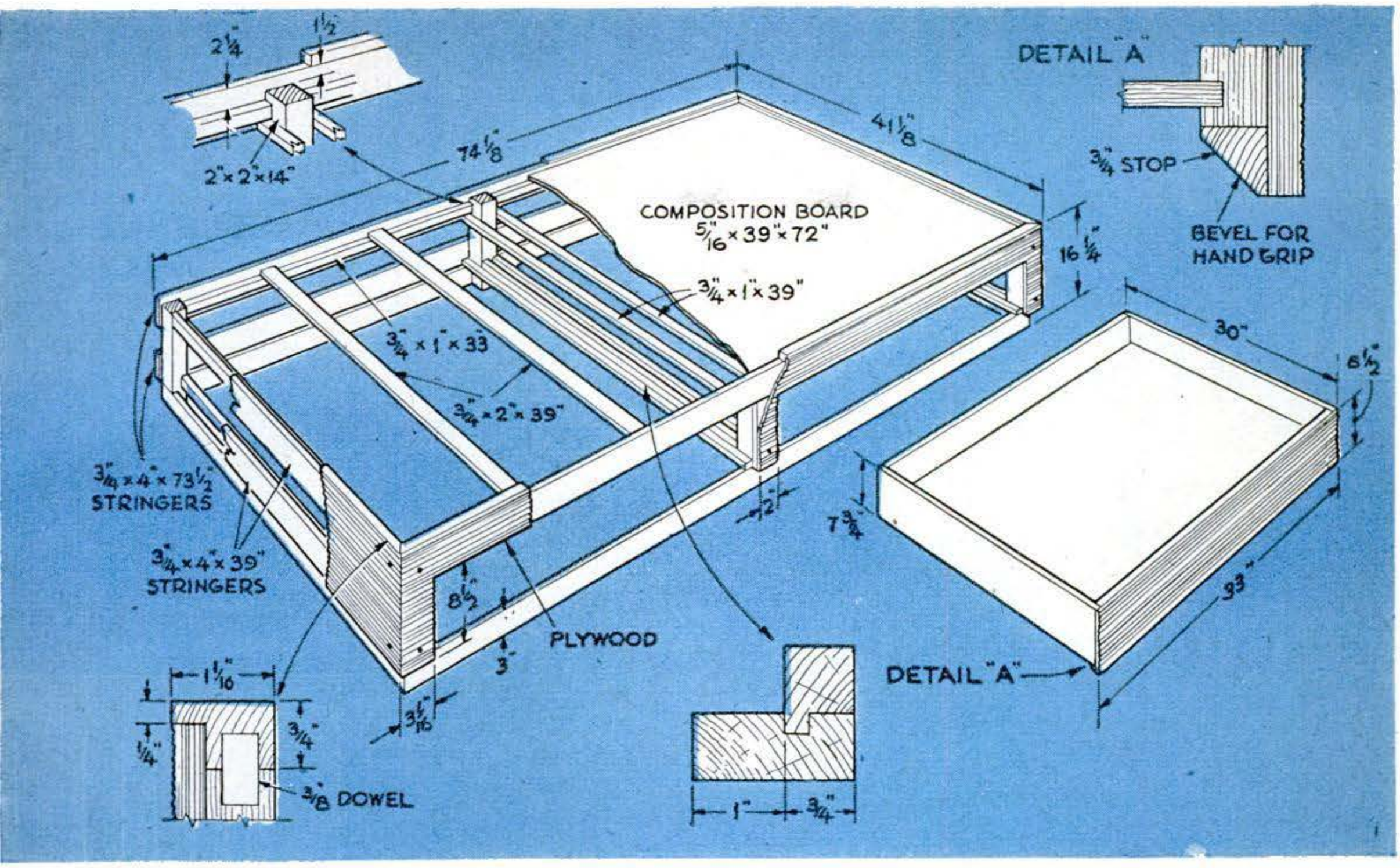

kick plates to the legs, and miter all exposed corners.

The composition-board floor for the mattress rests on cross slats supported on cleats. The upper drawer runners are single hardwood strips; the lower ones each consist of two hardwood pieces tongue-and-grooved together to form an L-shaped track.

Plywood facing. Fasten the hardwood cap molding with dowels to the top stringer. Its 5/16″ rabbet conceals the edge of the 5/16″ plywood facing. The combed plywood is then glued to the frame. I added chromium-plated screws in cup washers at the corners for extra strength, but you can also use headless brads that won't show.

In making the facing for the front, it's not necessary to cut it out of a single panel, since the plywood can be easily pieced without the joints showing.

Drawers. These are made of ⅞″ maple, tongue-and-grooved and glued and screwed together. The fronts are ¾″ deeper at the bottom than the sides so they will overlap the runners and act as a stop. The bottoms of the drawers are ¼″ composition board fitted into ¼″ grooves in the sides.

You can paint the bed, or leave it natural, as I did. Several coats of clear lacquer, steel-wooled and polished, gave me a fine job.—*Andrew Takas, Levittown, N. Y.*

What Would You Do?

My little girl was heartbroken when she lost a piece from her jigsaw puzzle. I don't have a jigsaw but I made a new piece for the puzzle all the same.

I put together the rest of the pieces, lined the empty space with wax paper, and pressed plastic composition wood into the paper-lined mold. When the new wood dried, I sanded it smooth, pasted a paper backing to both sides and colored the top to match the picture.—*Mrs. H. E. Meleney Jr., White Plains, N. Y.*

Have you pulled off a smart one lately? PSM will pay for acceptable contributions showing ingenious solutions of problems in the home, shop, garage or camp. It doesn't matter if it's wacky—if it works. Use government postcards only. Contributions cannot be acknowledged or returned.

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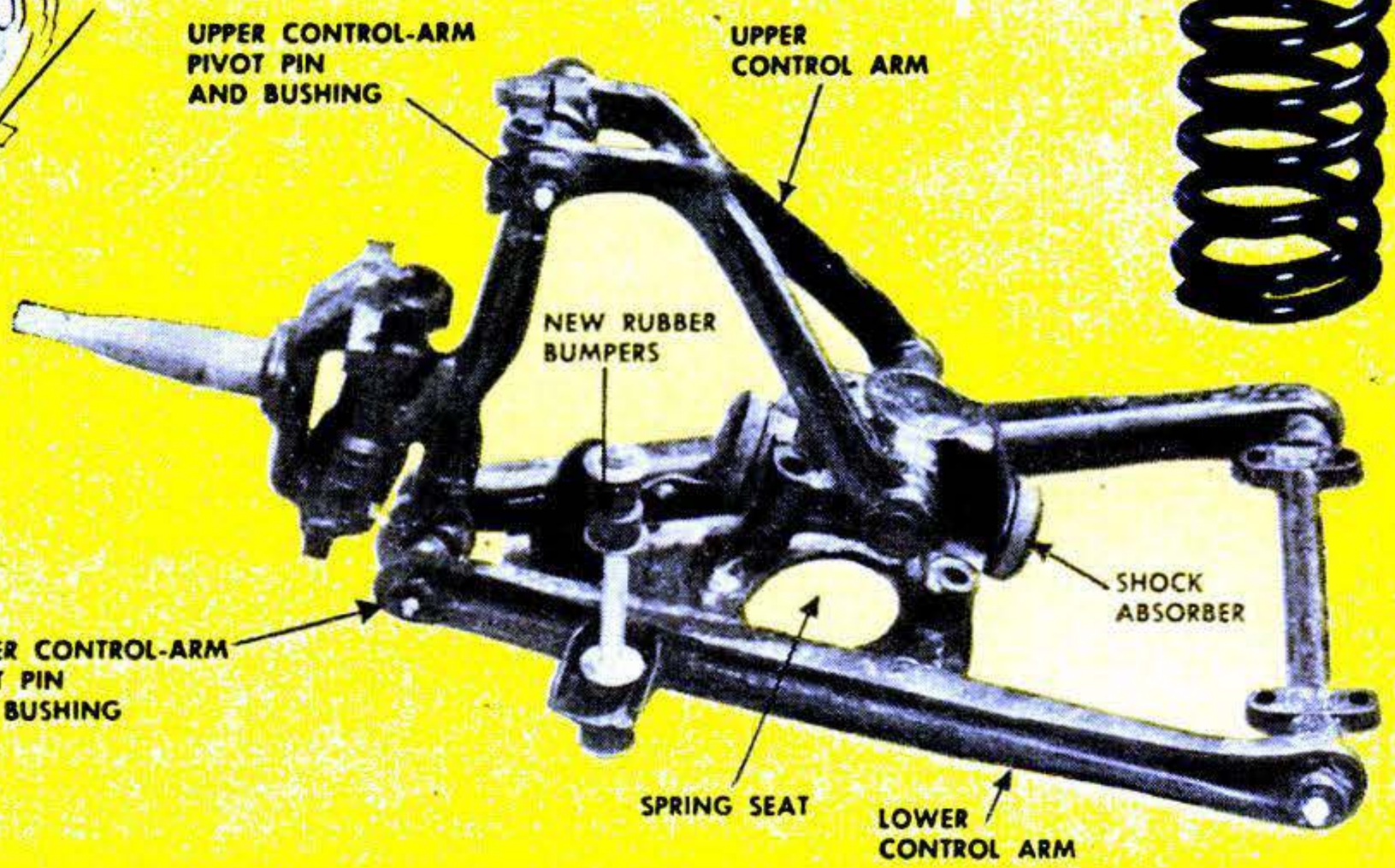
How to Install a

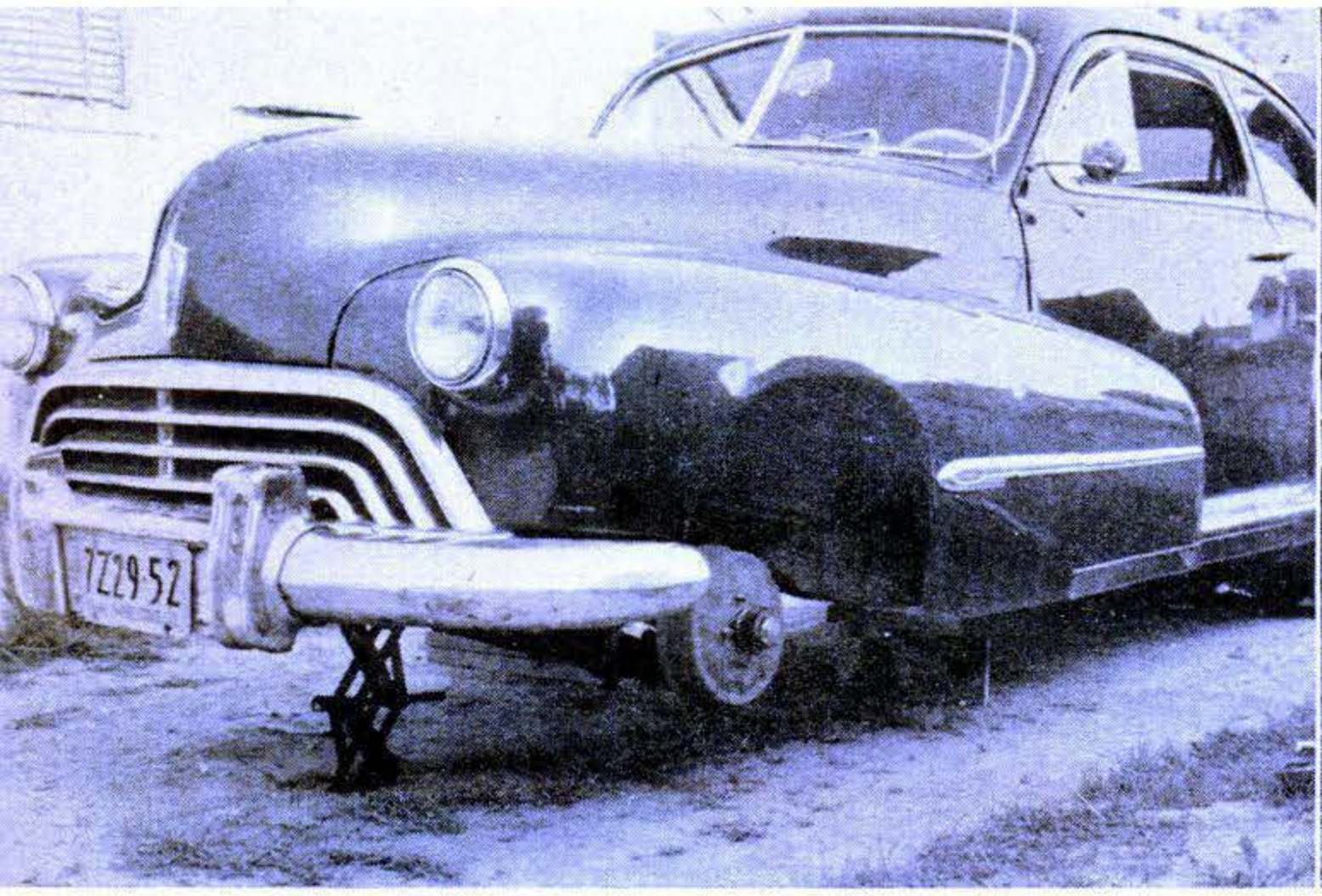
Trade in that road-weary assembly for a reconditioned unit. A bolt-on job, you can do it in an afternoon.

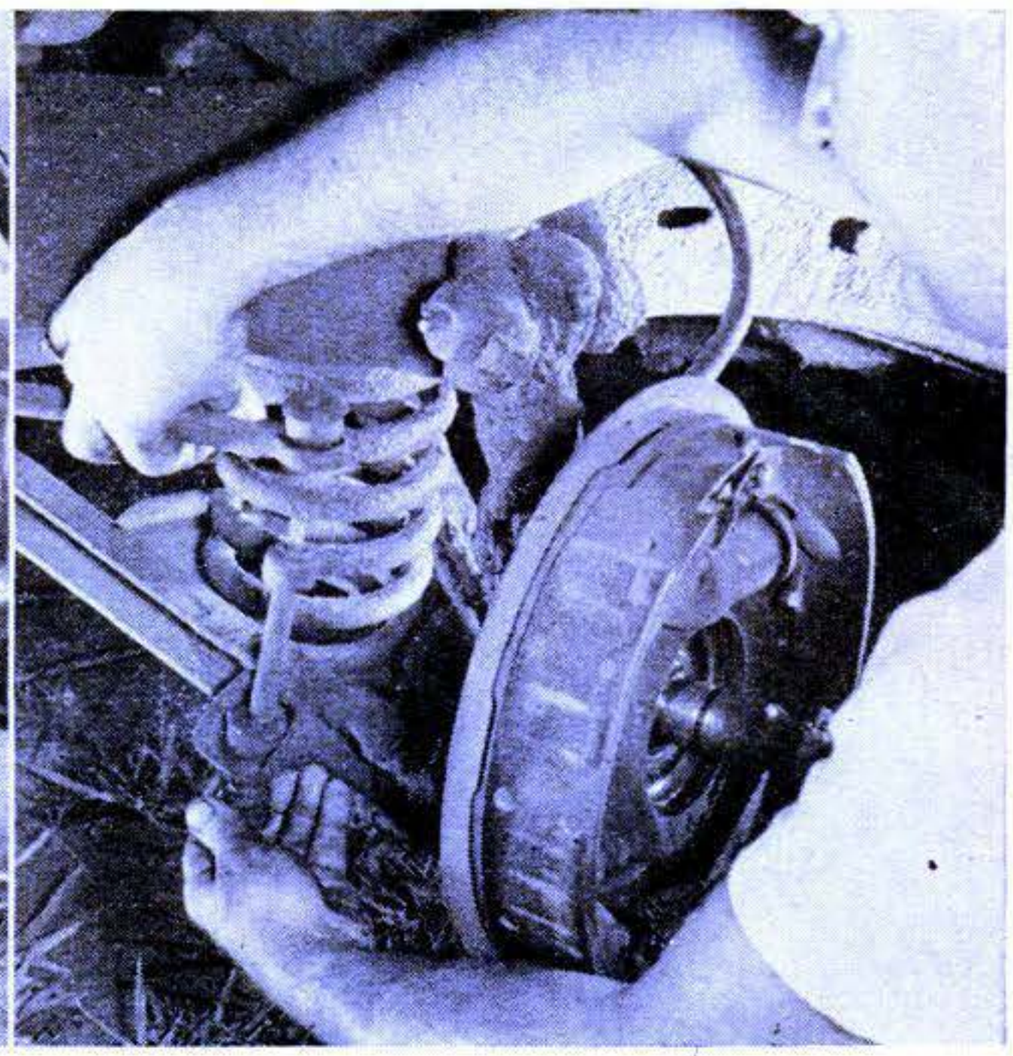
By Herbert R. Pfister



1 Block up car safely. Pull hand brake tight and chock rear wheels. Jack up car and put heavy blocks under frame to support it about 18" off ground. Don't set car on jacks alone; metal-to-metal contact and small base could spell trouble. Extra jack, or more blocks, under front transverse frame member forms stable tripod of supports.

2 Remove stabilizer links and push stabilizer arm up out of way. Take off brake drums, inspect wheel bearings and races, and put them in solvent to dissolve old grease.





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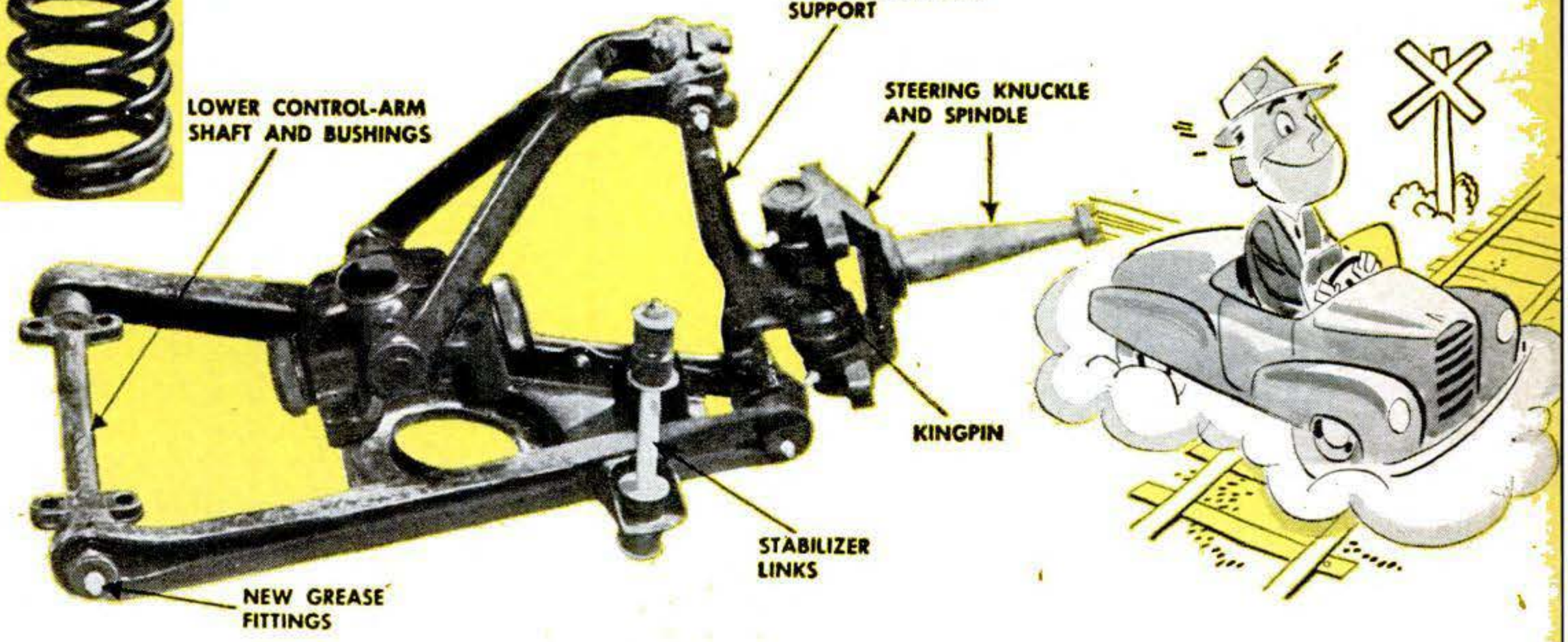
Front-End Assembly

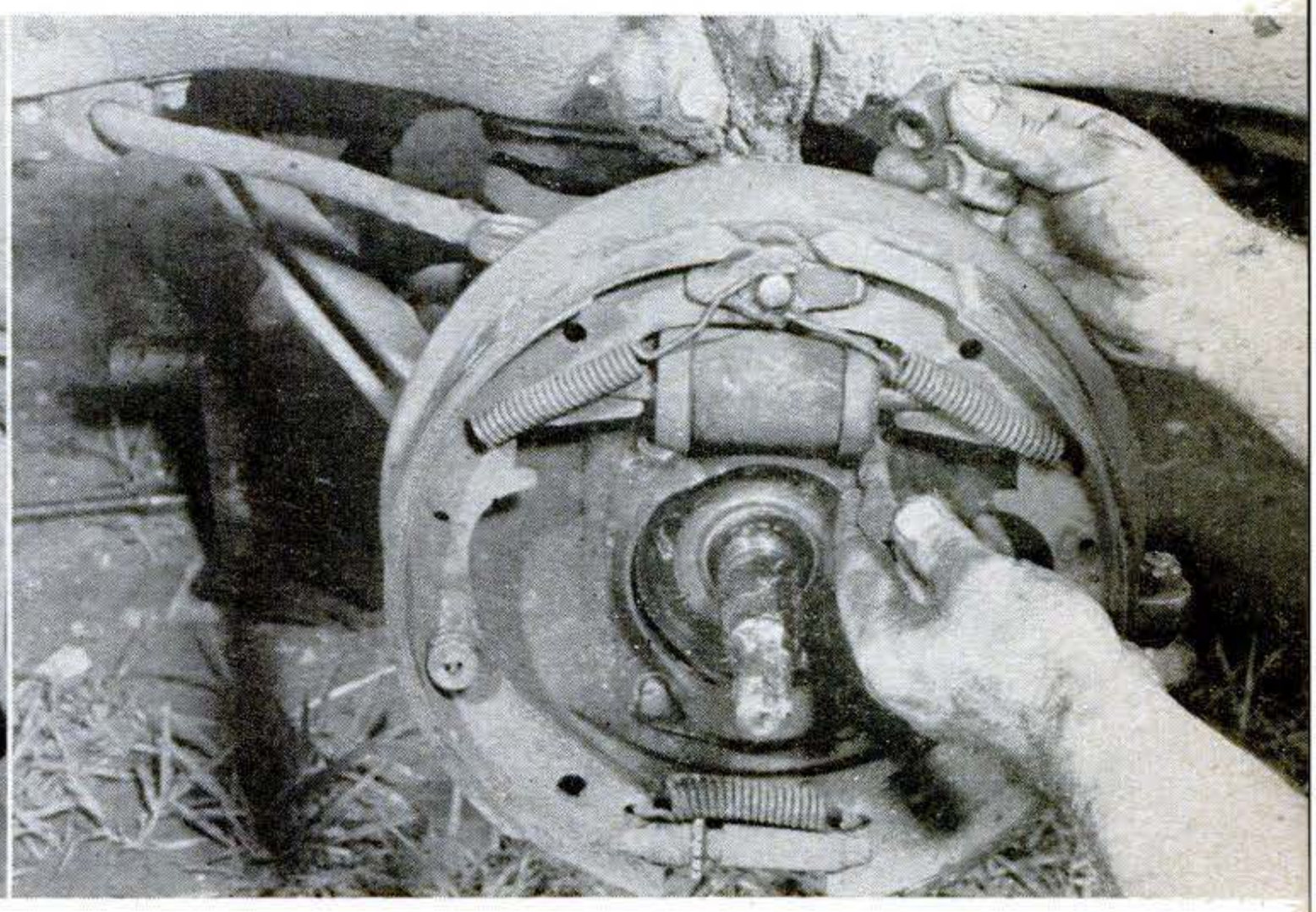
A BAD front end can make an otherwise perfectly good automobile seem like a loosely piled load of scrap. If you get a square-wheel ride and the tires squeal on gentle curves, your best bet may be a factory rebuild. You need an afternoon's time and a set of box wrenches to install it yourself.

What is a factory rebuild? These assemblies are difficult to tell



3 **Disconnect brake line** where flexible hose joins metal tubing. If convenient, brake-shoe backing plate can be suspended from fender brace with wire, making this unnecessary.

4 **Remove four bolts** that hold brake backing plate on steering knuckle and slide plate off spindle. This will release steering arm, which is left undisturbed on tie rod. Small collar in right hand is one of two spacer collars held between backing plate and steering knuckle by two upper bolts. Take care not to get grease or oil on brake lining.



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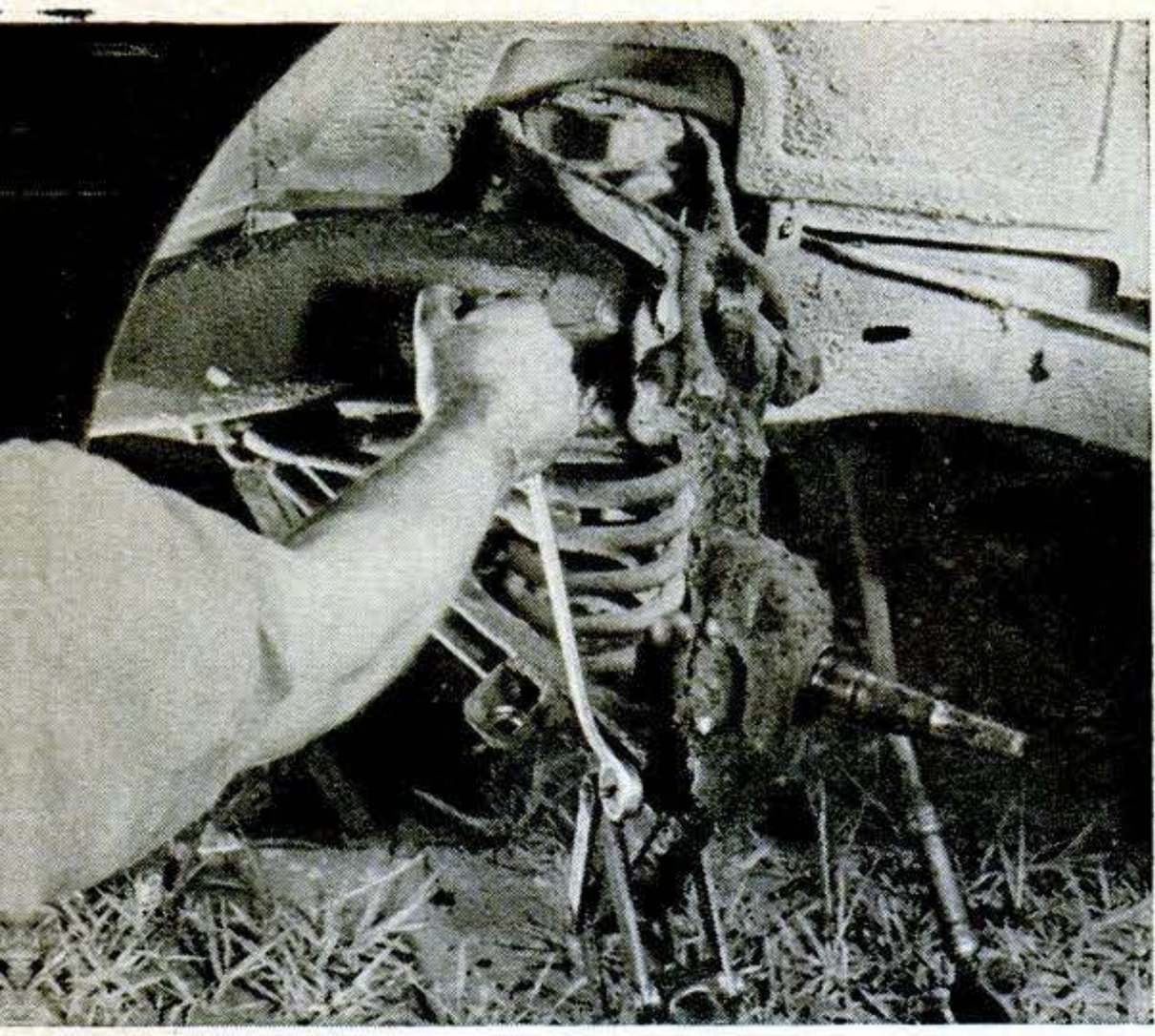


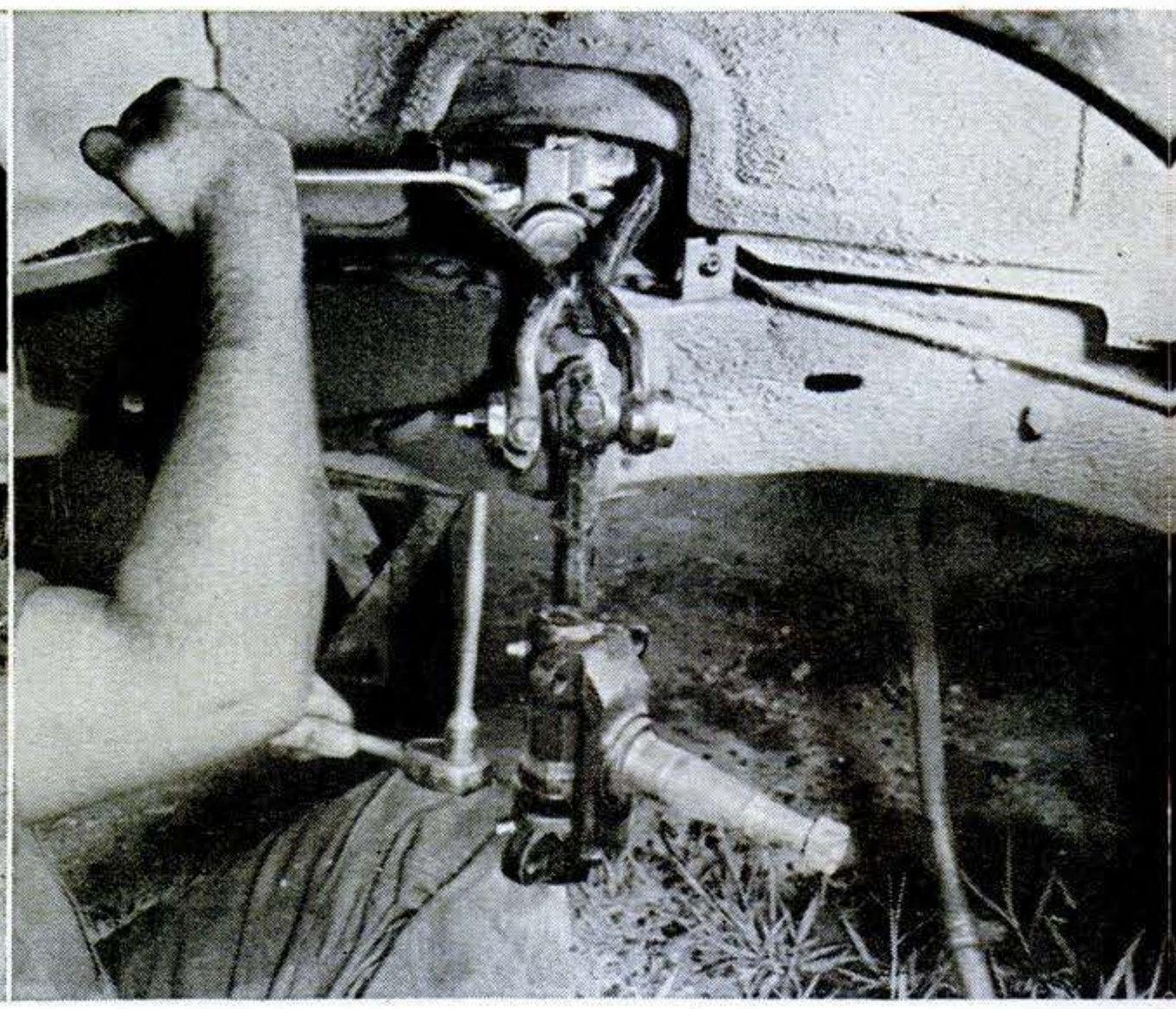
5 Remove pivot pin. Place jack under lower control arm, unscrew lock nut and remove pivot pin from lower control arm. This separates upper assembly from lower control arm, permitting removal of spring.

6 Worn threads of pivot pin indicate that replacement has been long overdue. Practically all flexing action takes place on upper and lower pivot pins, causing rapid wear if they are grease-starved.

from new replacements. Shock absorbers, control arms and steering knuckles have been restored to like-new condition, and *new* pivot pins, bushings and kingpins have been fitted to them. New grease fittings, rubber bumpers and rubber-cushioned stabilizer links complete the restoration. Each unit is completely assembled, ready to be installed on the frame of your car, making reaming of kingpin bushings and tedious fitting unnecessary.

New coil springs are not included and may not be needed unless the old ones show signs of fatigue. But their cost is so reason-

9 Nothing left now except tie rods and steering arms, which are washed and ready to be linked to new assembly. This is good time to check tie-rod ends for looseness and replace if necessary. Tripod method of blocking up car can be clearly seen.



10 Begin assembly. Remove lower control-arm pivot pin on rebuilt unit to separate arms. Clean frame with wire brush and bolt shock absorber on. Cam-locking pliers, snapped on nuts, act as third hand while bolts are tightened from under hood.

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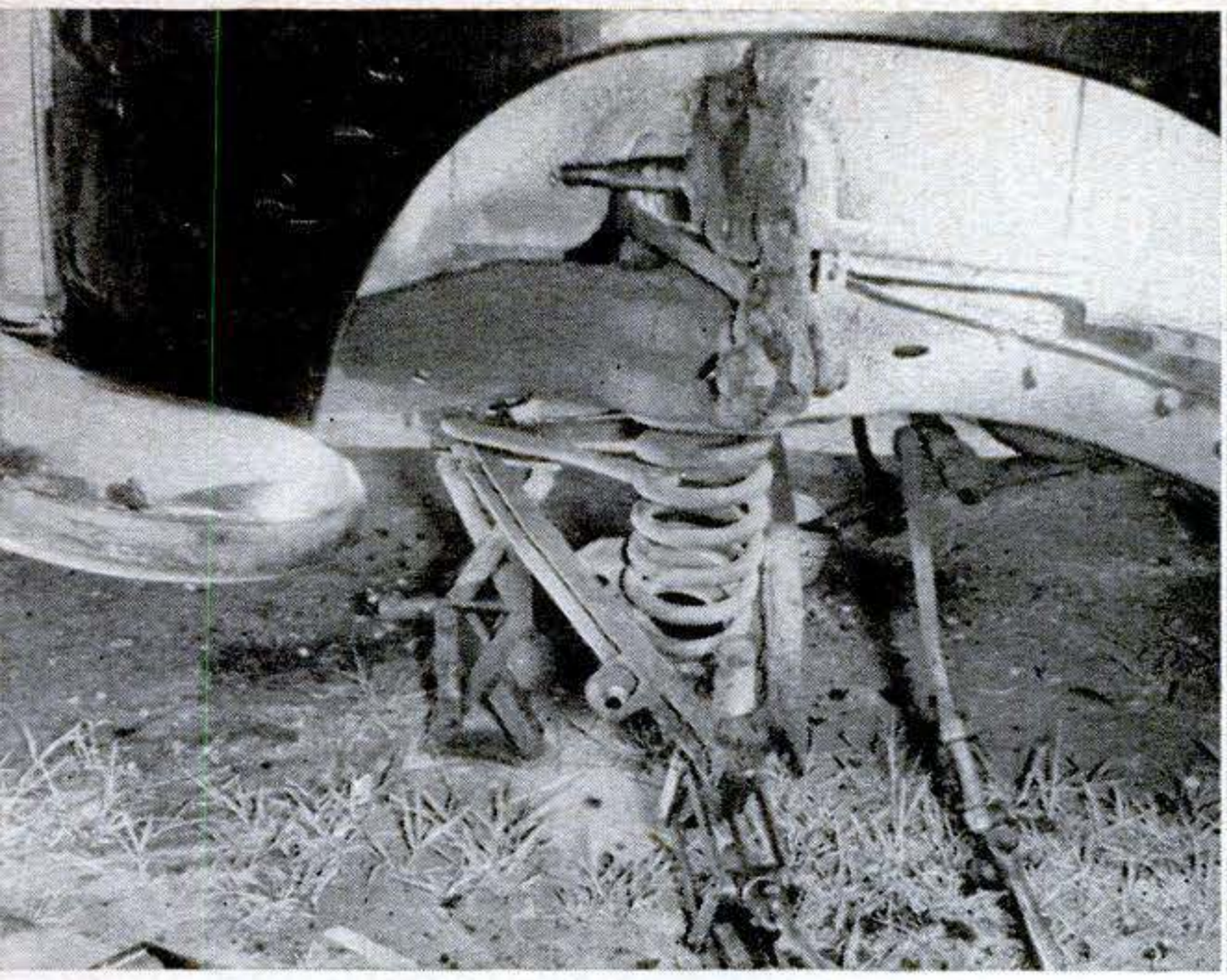
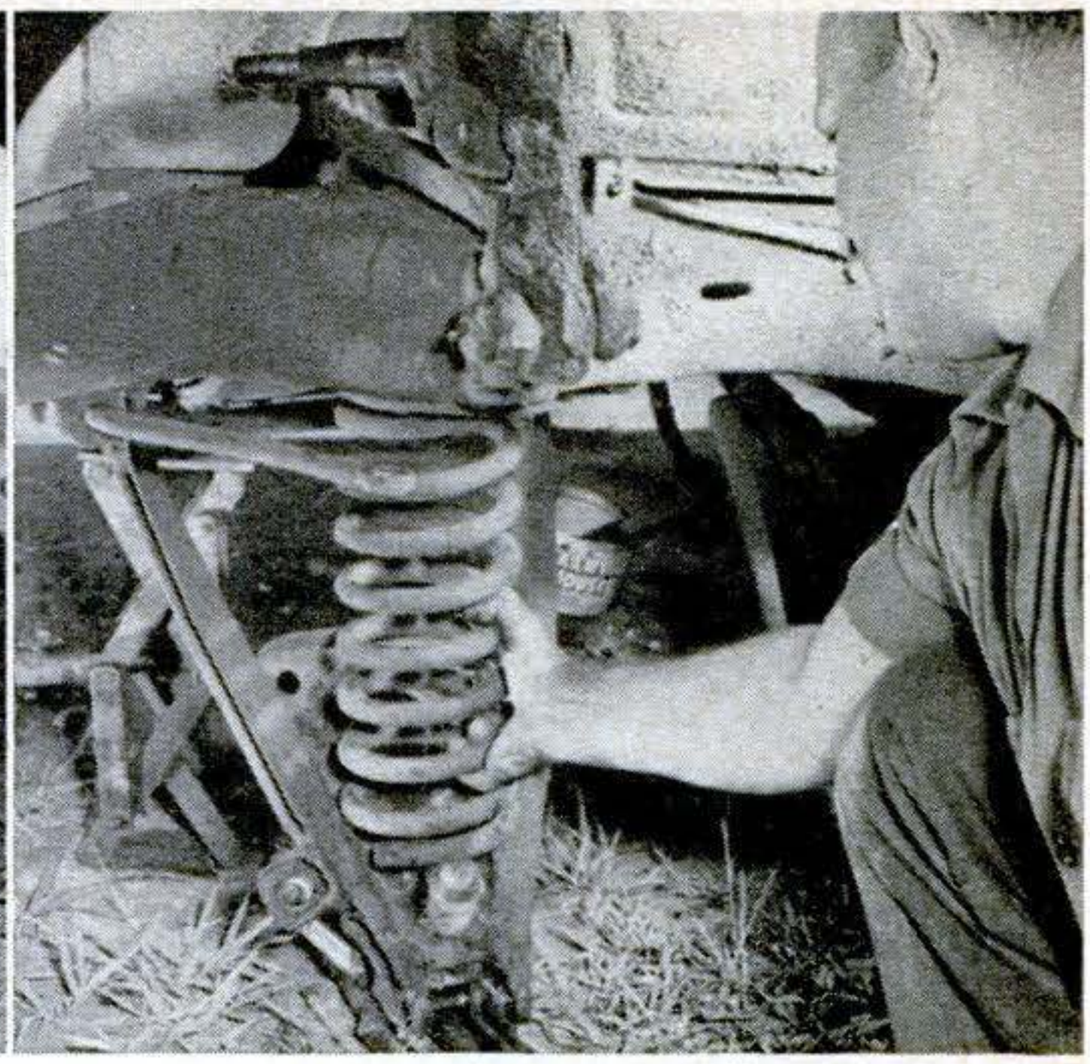


7 Let jack down slowly to drop the lower control arm and gradually ease tension off the coil spring. Note how the steering knuckle and spindle have been pivoted back out of the way over the shock absorber.

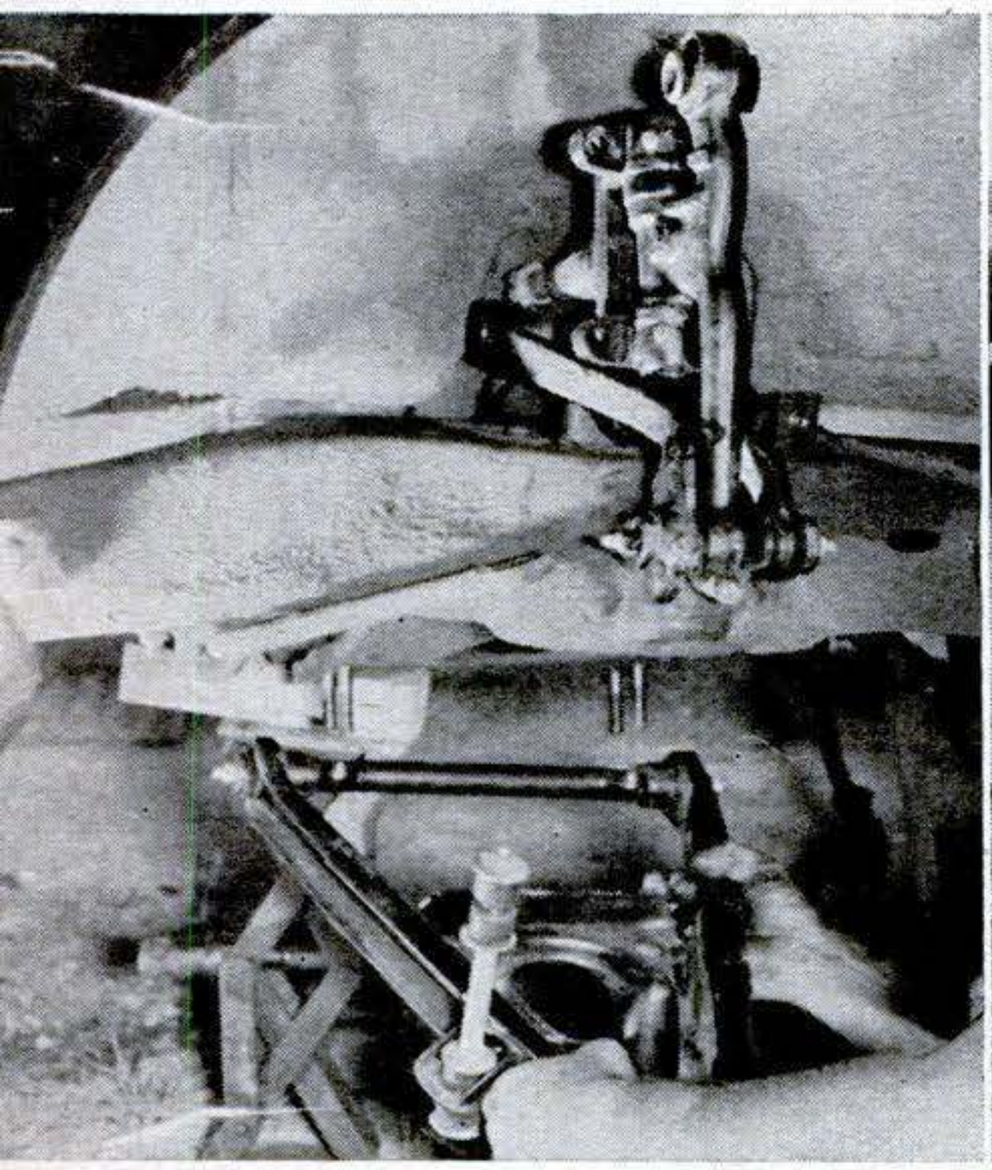


8 Fully relaxed spring can be lifted out of spring seat when control arm is lowered. With spring out of way, lower arm comes off safely, and shock absorber can now be removed as nuts are in upper spring recess.

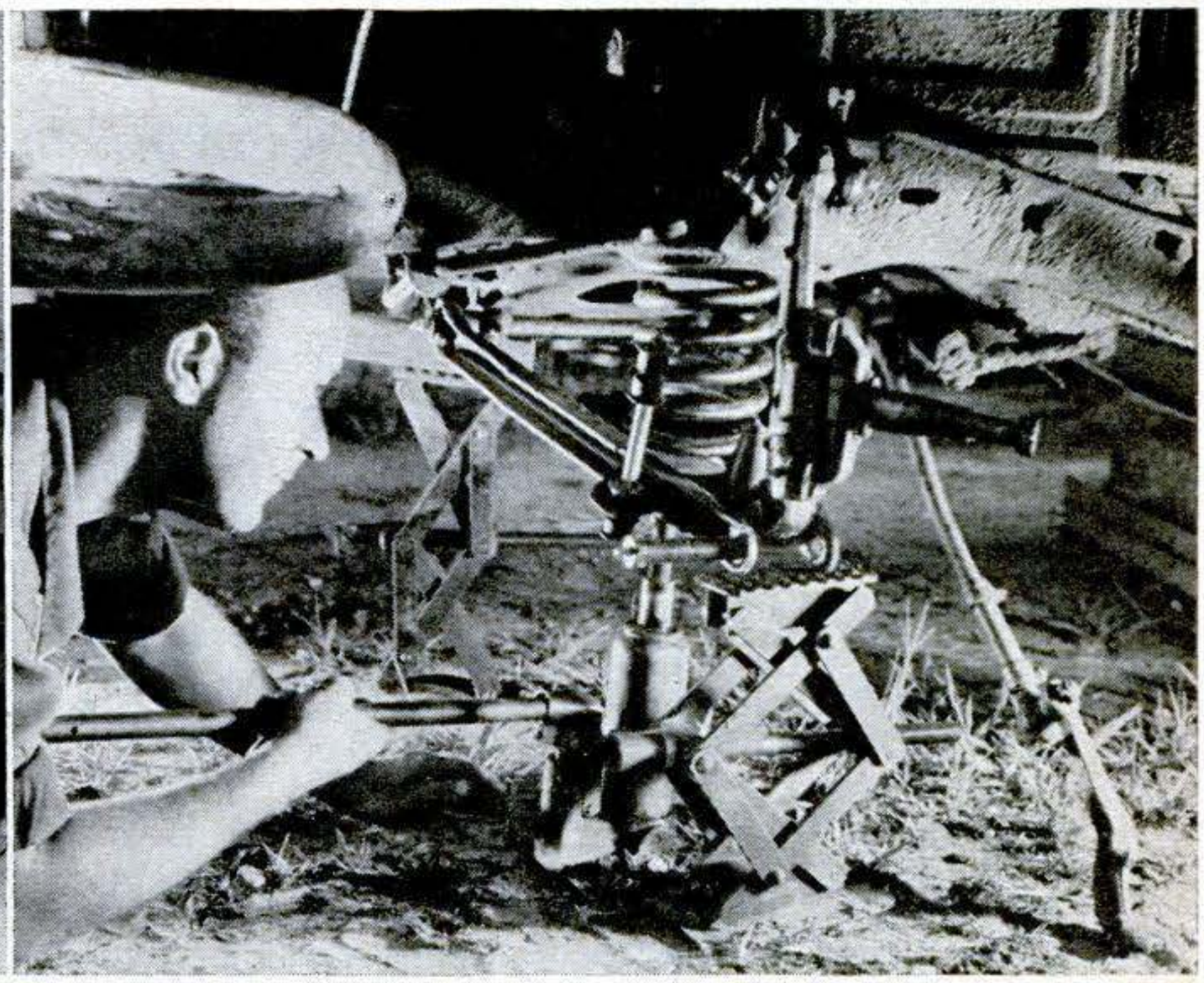
able ($9 to $12 per pair) that replacement now is a good investment for the future.

Where to buy them: Auto wreckers, parts shops and some auto-supply stores are finding an ever-growing market for the rebuilt assemblies. I bought mine from a local automobile-supply dealer, the Flushing Motor Service, 135-01 35th St., Flushing 54, N. Y.

Cost: The price tag, depending on the make of car, is between $55 and $70 plus your old front end in exchange. The only other cash outlay is the charge ($5 to $7.50) for having the wheels aligned when you are finished.



11 New lower control arm is lifted into position on transverse frame member. Use *new* bolts, nuts and lock washers here as lower arm takes brunt of road shocks.

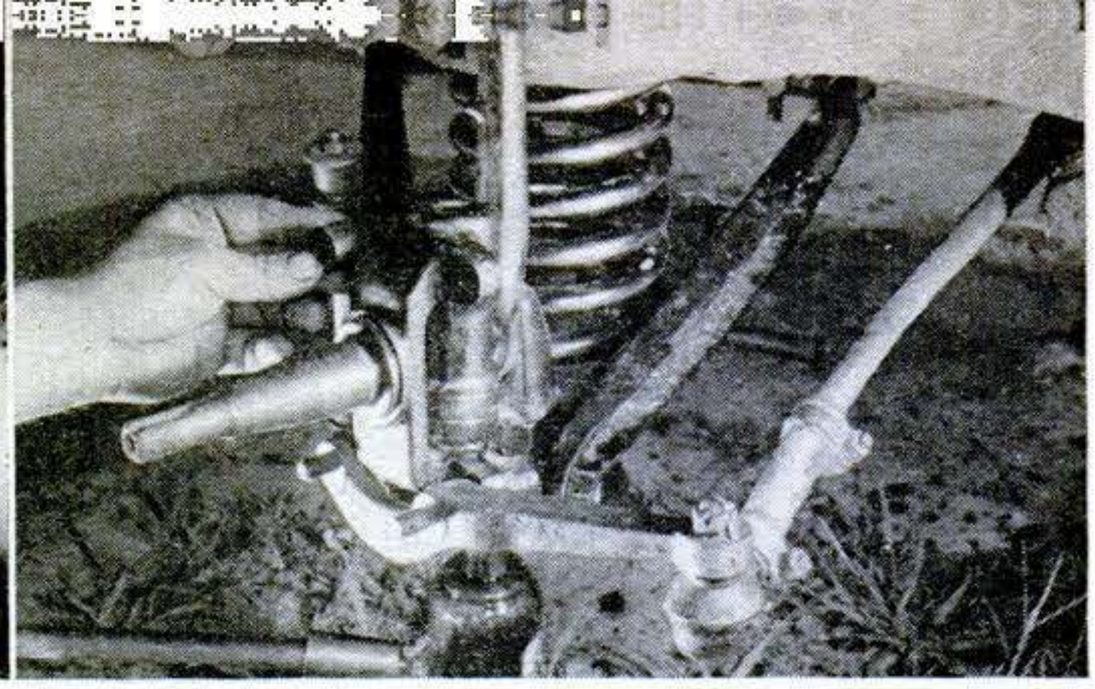


12 Insert spring in seat flat end up. Turn it so bottom end of coil fits into shaped lower spring seat. Here hydraulic jack lifts control arm against spring tension while scissors jack, raised by hand, follows to catch arm if hydraulic jack should slip. Raise arm until threaded holes line up, then slip rubber dirt seals on pivot pin and screw it in.

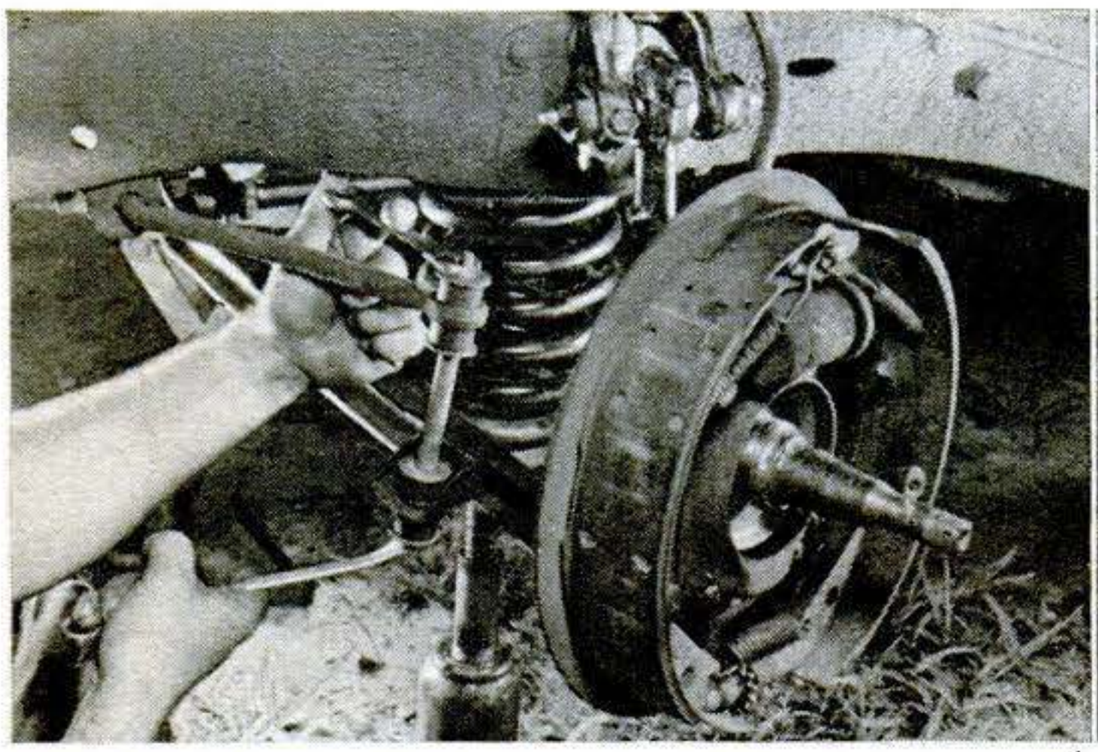
Please turn the page for more front-end photos.

Copyrighted material

13 **Don't forget lock nut.** Shakeproof washer and lock nut hold pivot pin secure. If pin should work loose while riding, you'll need another front end—possibly another car, although looseness in running gear should be detected by an alert driver.



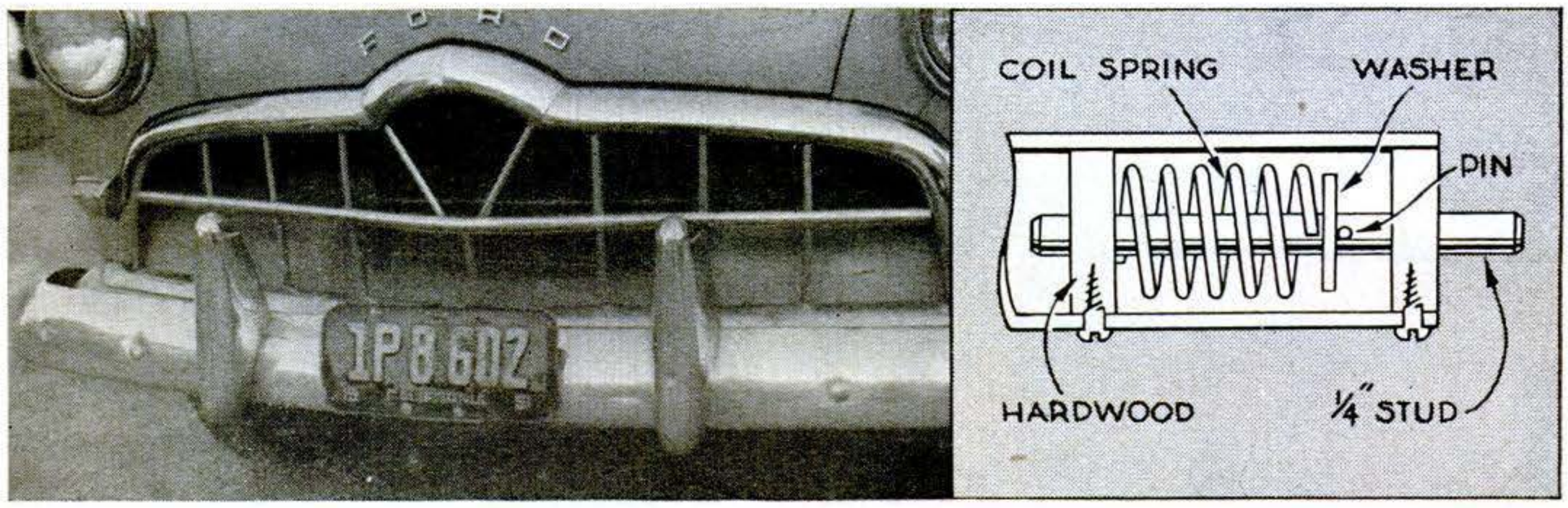
14 **Set steering arm** on original bolts pressed into holes in steering knuckle. Steel spacer collars (in hand) make up thickness of steering arm. Slide brake backing plate on spindle, and tighten nuts. Use new cotter pins to lock castellated nuts.



15 **Attach new linkage** to stabilizer arm and connect brake hose. Finish washing wheel bearings and races, and pack with fibrous wheel-bearing lubricant. Mount brake drum and bearings on spindle, adjust castellated spindle nut—and don't forget the cotter pin.

16 **Bleed brake lines** with bleeder hose into a jar of brake fluid to eliminate air bubbles. Then drive slowly to nearest wheel-alignment shop and have camber, caster and toe-in set by machine. Also have entire assembly greased unless you've already done so with hand gun.

Open Grille Helps Keep Engine Cool and Makes Heads Turn to Look



Ever since I installed a new grille on my car, people keep exclaiming:

"Look! The new Ford!"

I made the change because I frequently haul a trailer over desert roads. The new grille allows air to flow freely through the radiator and keeps the engine cooler. In desert driving, that's important.

The cross bar is 1¼" stainless-steel tubing, the uprights ½" tubing driven into slightly undersize holes drilled through the larger one. Studs made of ¼" screws fit into wood plugs driven into the ends of the 1¼" tubing One stud is spring-loaded as shown in the drawing so the assembly can be snapped into ¼" holes used for the original grille. Metal screws hold the center slanted bars at the top.—*H. E. Eckler, Topanga, Calif.*

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For Your Car

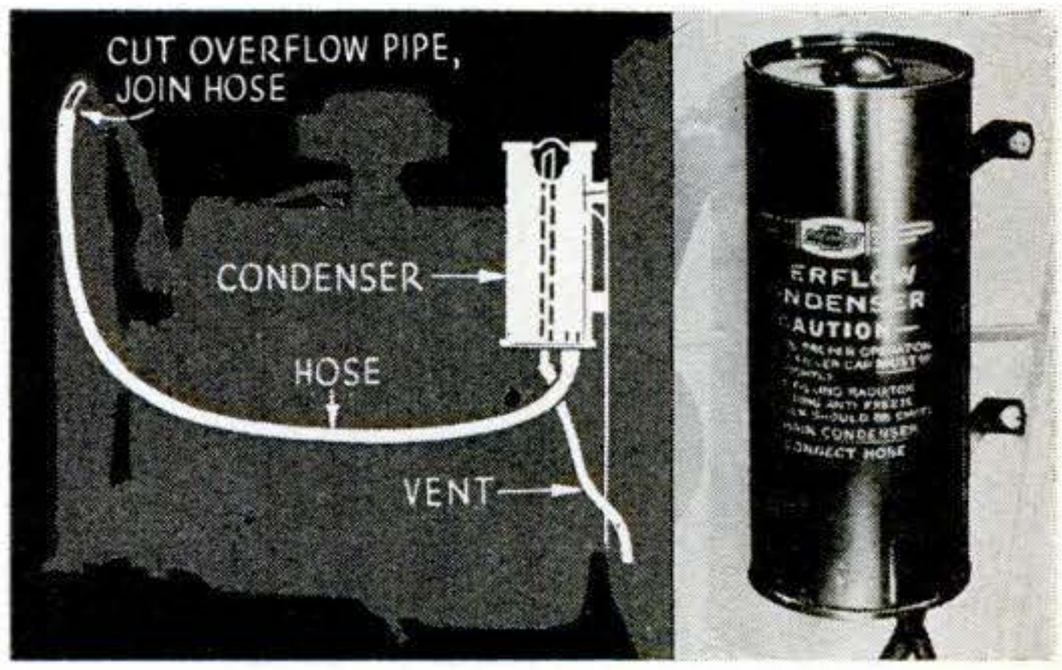
Safety Belt Has Chest Strap

THIS safety belt for the front seat grips an occupant by the shoulders as well as the waist in a collision or sudden stop. It is anchored by a U bolt set in the floor of the car 8″ to 12″ behind the front seat and will not interfere with the folding action of the front seats in two-door cars. One leg of the belt goes around the passenger's waist and the other over his shoulder like the Army's old Sam Browne belt. The webbed belt is said to take a straight pull of more than 1,500 pounds without breaking. *Air Associates, Inc., Teterboro, N. J.*

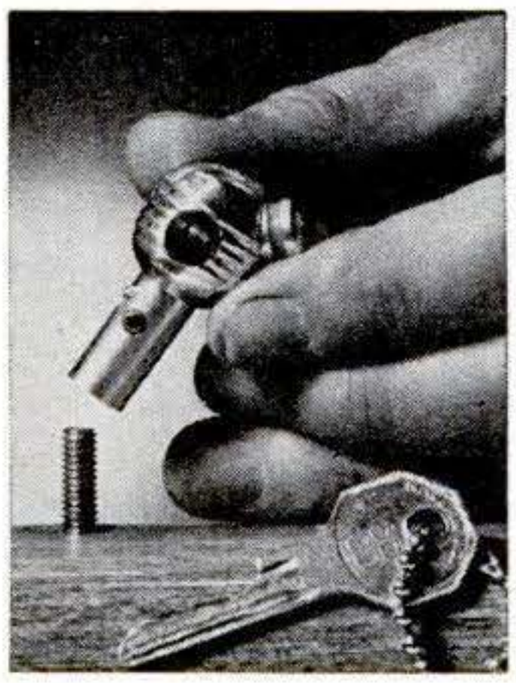
Spray Rustproofs Chrome

POLARIZED oil in this spray can is said to protect automobile chrome and other metals against corrosion and rust. Besides rustproofing the chrome on cars, it is also designed for use on tools, guns, lawn mowers and fishing gear. *Ames Chemical Co., 4025 Pasadena Ave., Detroit 4.*

Condenser Saves Antifreeze

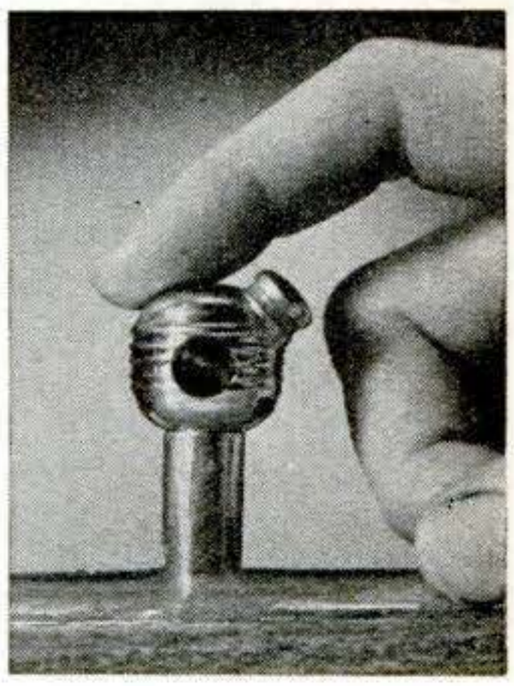


A SURGE tank, or overflow condenser, is a Chevrolet accessory to save antifreeze normally lost out the overflow pipe when excess pressure opens the relief valve in the radiator pressure cap. Vaporized coolant condenses in the tank and is later sucked back into the radiator through the radiator-cap vacuum valve when the engine cools and the pressure drops below atmospheric. The tank is lead-coated inside to resist rust.



Lock Safeguards Rear Doors

A NEW lock for rear car doors replaces the conventional lock button, giving you either safety locking or normal locking. Pushing a button locks it down so that it can't be pulled up, preventing accidental opening of the doors by children. Unlocking it with the ignition key returns it to normal use. The Safety Kid lock fits all cars except Studebakers. *Semco Research, Inc., 212 W. Florence Ave., Inglewood, Calif.*



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Gus Stops the Music

Tracking down the weird whistle that outraged Mr. Adamus' delicate ear was the toughest tune-up Gus ever tackled.

By Martin Bunn

WHEN Johnathan Adamus drove up in his flashy new Chrysler convertible, Gus Wilson couldn't help but grin at the contrast. Adamus looked as if he had stepped out of a tintype. He still wore a high stiff collar, an old-fashioned suit that pinched him and high-button shoes. For some reason or other he always reminded Gus of Ludwig van Beethoven. Possibly the reason simply was that Adamus led the high-school orchestra, gave piano lessons and talked constantly of "music appreciation."

Adamus was pale when he rolled past the pumps and stopped. His hands shook, and he had the frenzied look of a musician involved in a Rachmaninoff concerto.

"Mr. Wilson! Mr. Wilson, you must help me! I'm losing my mind, my sanity, do you hear? My position at the high school, my reputation, everything!" He peered at Gus closely with pale blue eyes. "Something is bound to snap."

Gus stepped back a little.

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Placing the slender instrument to his lips, Adamus blew one piercing note.

"What you need is a doctor, Mr. Adamus. I'm just a mechanic."

"No no no! You don't understand! It's my car, my new car. You must realize that I drive a great distance to school each morning, and home again in the evening. Listen . . ."

Engine Whistles While It Works

Johnathan Adamus depressed the accelerator slightly, and winced.

"I hear a slight whistling noise, if that's what you mean."

Adamus shuddered like someone who had just stepped barefooted on the remains of a jellyfish.

"It doesn't sound serious. Could be a—"

"Not serious! Do you realize that the whistle is a *quarter*-tone below A-flat? Quarter-tone, flat, nasal. It grates on my nerves. It drives me to complete and utter distraction! I'm useless by the time I reach my music-appreciation class, my absolute pitch twangs like a Mexican guitar! And the school board has noticed I'm falling down in my work of late. Three mechanics have looked for the trouble with this car and can't find it!"

Gus didn't know anything about absolute pitch, and not too much about music, but whatever was wrong with the car certainly had Adamus walking up the walls.

"Well, I don't know why that noise should be so hard to cure."

Gus left him sitting nervously on the shop bench. He lifted the hood on the Chrysler. Any number of malfunctions could cause a whistle or a canary. Sometimes it was lack of lubrication in the distributor, a bad gasket in the intake manifold, the fan-belt pulley, or some loose piece of metal setting up a high-pitched vibration.

Trouble Looks Easy to Fix

A similar complaint the week before had revealed a piece of paper inside a carburetor air cleaner—one of those mysterious little happenings nobody could explain. But none

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of it should send a man into near-hysteria. It was really very simple—or should be.

Gus pulled up on the accelerator arm and raced the engine. He bent his ear toward the sound, found its location, turned off the engine and smugly unfastened the air cleaner on the carburetor. He carried it to the workbench, and began taking the top off so that it might be cleaned.

Noise Begins to Get on Gus's Nerves

"This is the guilty party right here, Mr. Adamus."

Adamus looked at him with a baleful eye.

"If you're going to immerse that in some sort of volatile fluid, the other three have already done so."

"But—"

"It didn't do any good."

Gus took the lid off anyway, and looked closely at the cleaner. He shook it, and nothing rattled. He dipped it in solvent, and nothing dissolved. Gus shrugged and put it back in position over the carburetor. When he started the engine, the whistling was there as before.

"Did they look at anything else?"

"I suppose so, but I don't know anything about engines. I couldn't tell you. All I know is that if this thing goes on much longer, the school board will ask me to resign. They'll let that young upstart of a clarinetist take over."

Gus gritted his teeth and stomped over to the Chrysler again. It was getting ridiculous, and that flat sound was beginning to grate on his nerves.

He tightened up the bolts on the intake manifold and the sound didn't change. He then poured light oil around the intake gasket. None of it was drawn in, removing the possibility of a leak there. Something in the carburetor itself?

Gus attacked the carburetor with new fervor. Something small and mischievous was causing it all. The noise should have been simple enough for a juvenile Tinker-Toy artist to find. Instead, it was behaving like some sonic will-o'-the-wisp!

He didn't expect to find anything inside the carburetor, since it wasn't likely that foreign matter would be jammed in there without upsetting the running of the engine. But it never hurt to look and make sure. The net result was nothing.

"Maybe I'd better go," Adamus suggested hopelessly.

"No, not yet. Let me fool with it for a while. The darn thing is beginning to grab me by the hair!"

"Look, Mr. Wilson, I'd be perfectly happy if you'd fix it so it played just plain A-flat. Anything but that quarter-tone. Here, I'll show you—" Like a man possessed, he reached a skinny arm into the car and snatched something from the rear seat.

When he straightened, Gus saw that it was a flute. Placing the slender instrument to his lips, Adamus blew one piercing note. "There! That's A-flat! Make it whistle that, and I'll say no more."

"If I find it at all," Gus returned grimly, "I defy it to make so much as a peep."

The thing was growing to preposterous proportions, and Gus considered the situation. Sound sometimes performed peculiar antics. A noise could seemingly come from a certain spot, when actually it originated on the other side of the engine.

The Canary Continues to Sing

Gus took an oilcan and fed a few healthy squirts to the fan-belt pulley, lubricated the rotor in the distributor and searched for loose metal that might be vibrating. Yet the whistle persisted, like a one-note, tone-deaf canary.

Gus turned in disgust and sat down on the bench beside Adamus.

"Once a month, sometimes twice, just

[Continued on page 252]

GAS BUGGY DAYS

AROUND the turn of the century, the "Horsey Horseless Carriage" appeared. The phony nag's head on the dashboard was intended to calm high-strung steeds, often thrown into a tizzy at the approach of a clanking gas-driven monster.

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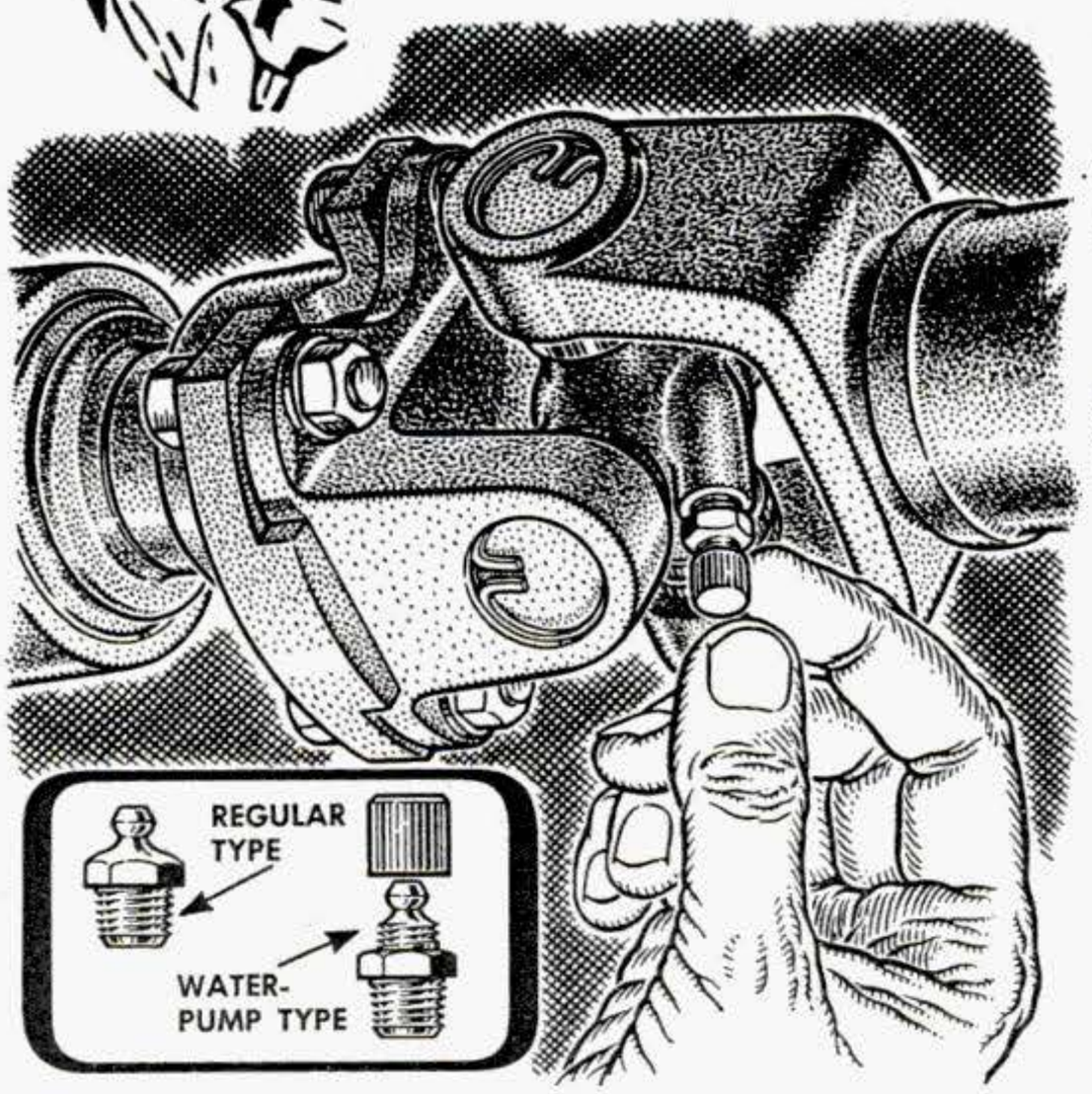
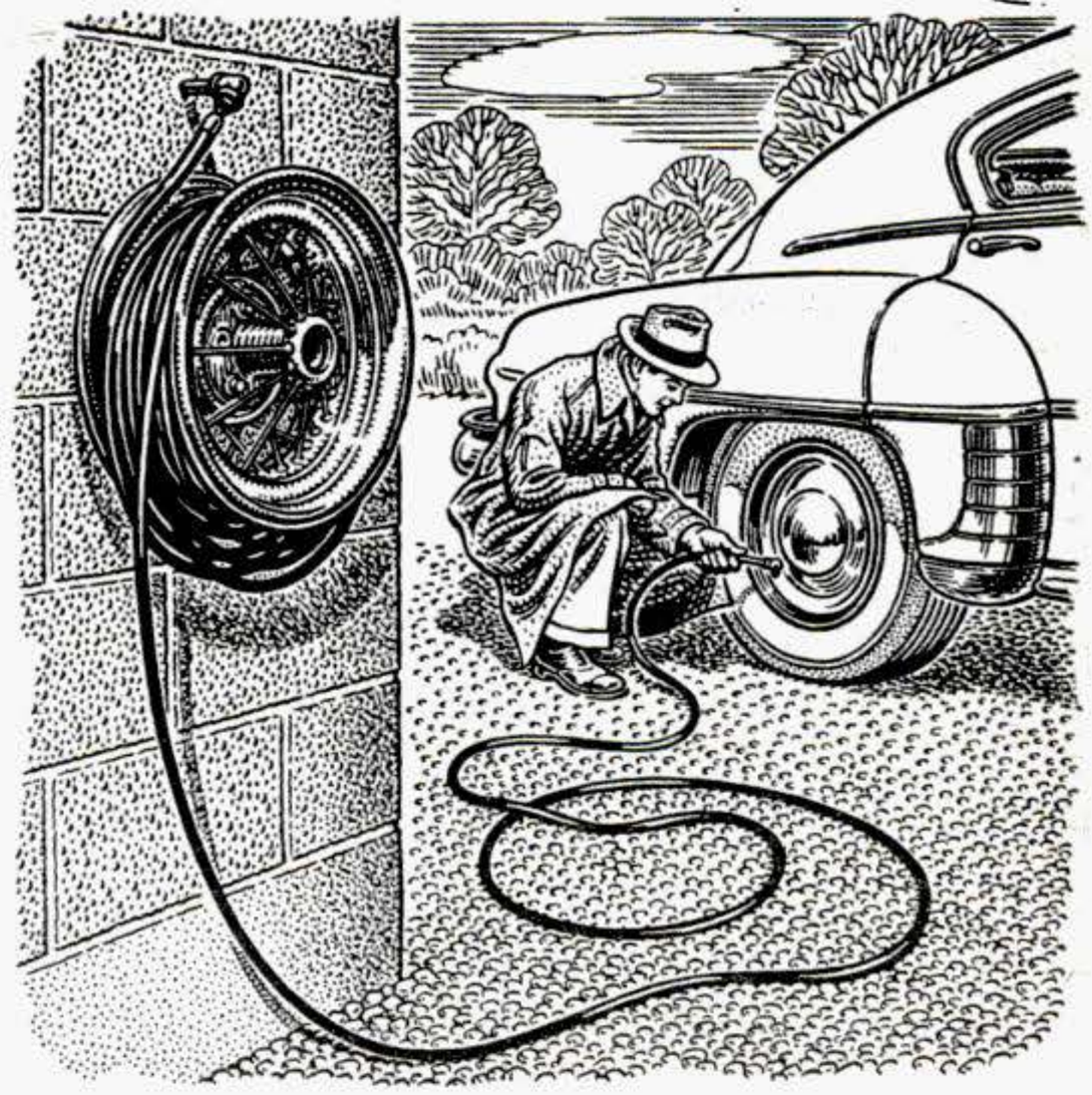
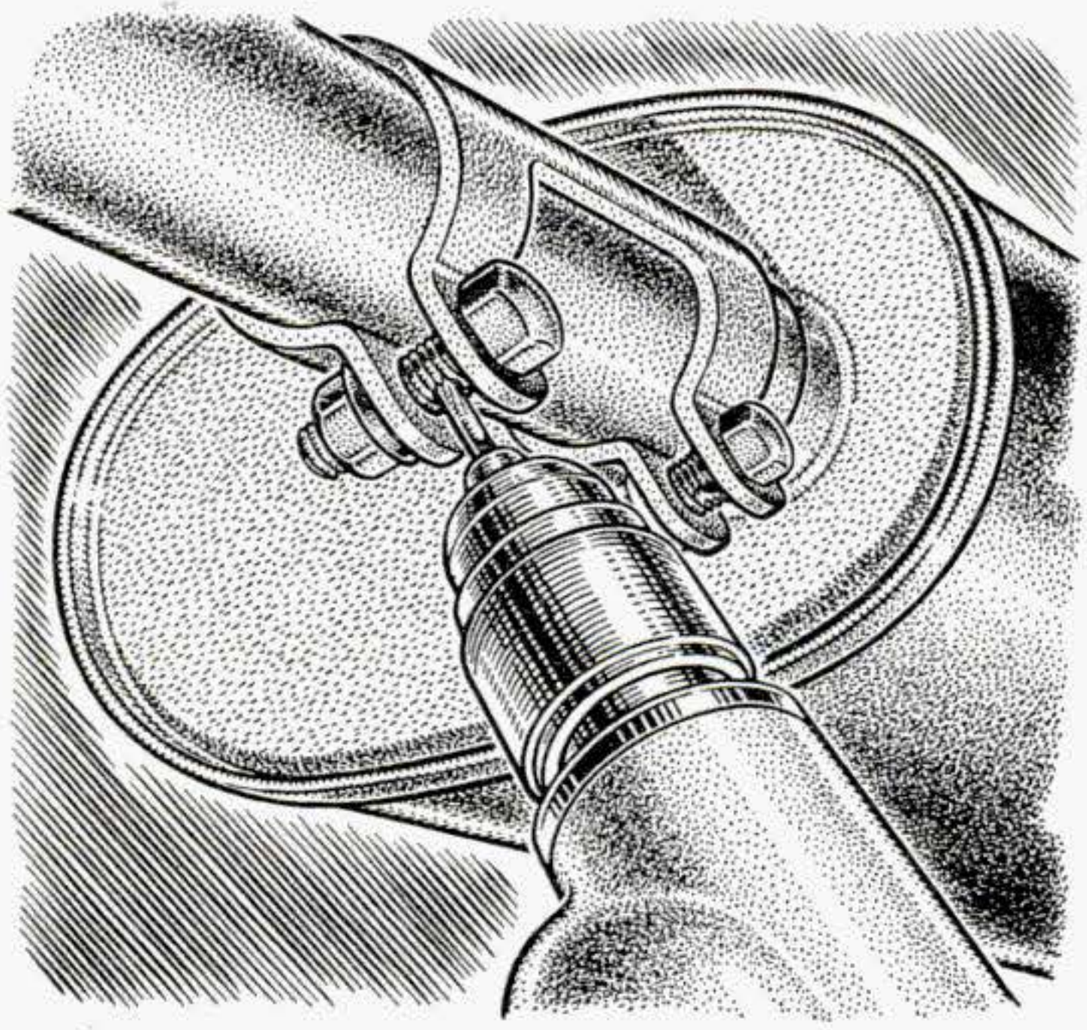
Hints from the Model Garage



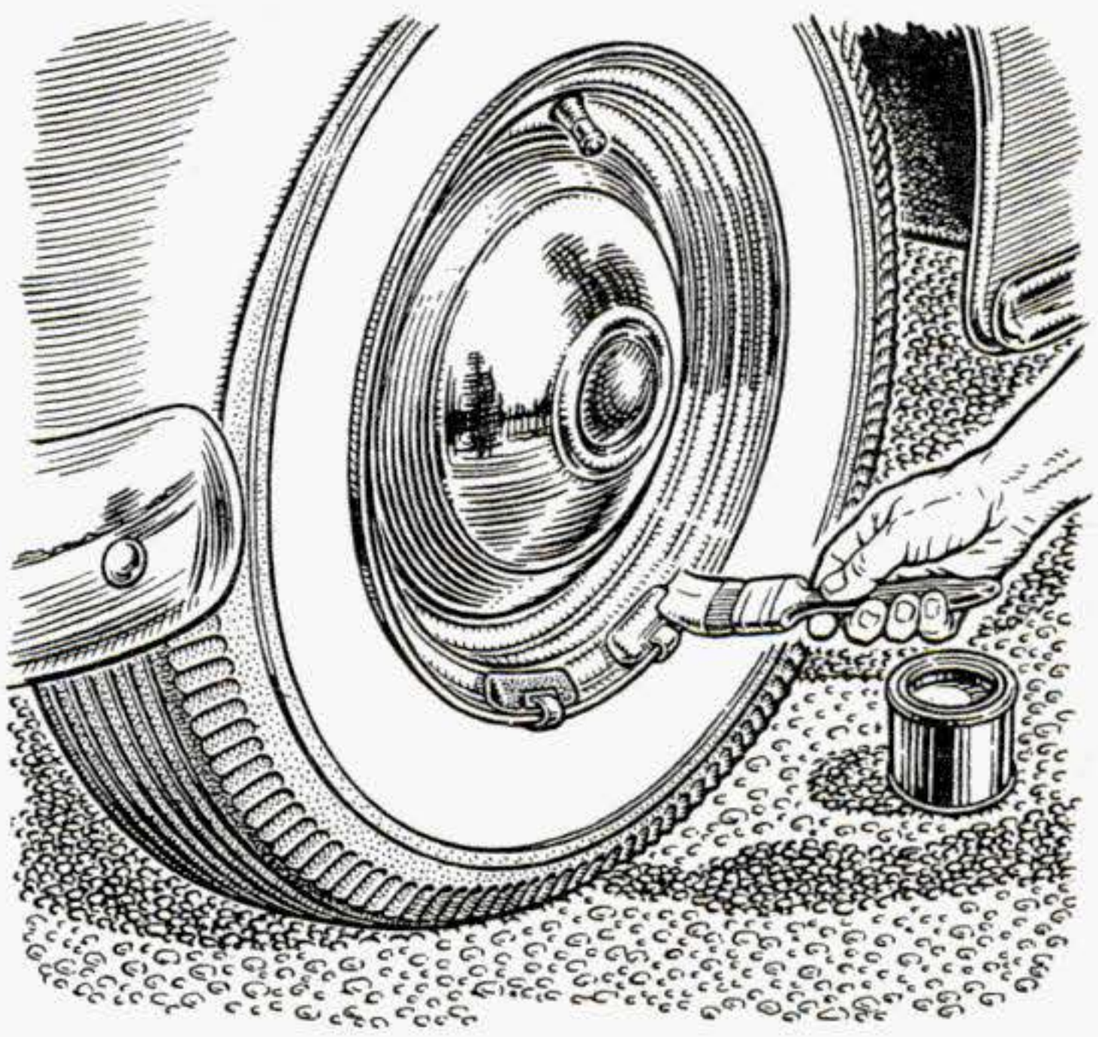
Grease fittings with caps are a worthwhile investment in under-car locations. Unless ordinary fittings are carefully wiped during a lube job, the gun may force specks of dirt inside, plugging the fittings or damaging the parts being greased.



An air-hose hanger for the service station can be quickly made from an old car wheel. Bolt it to the side of the building at waist height. This will keep the hose off the ground and make it easy to unwrap and replace after use.



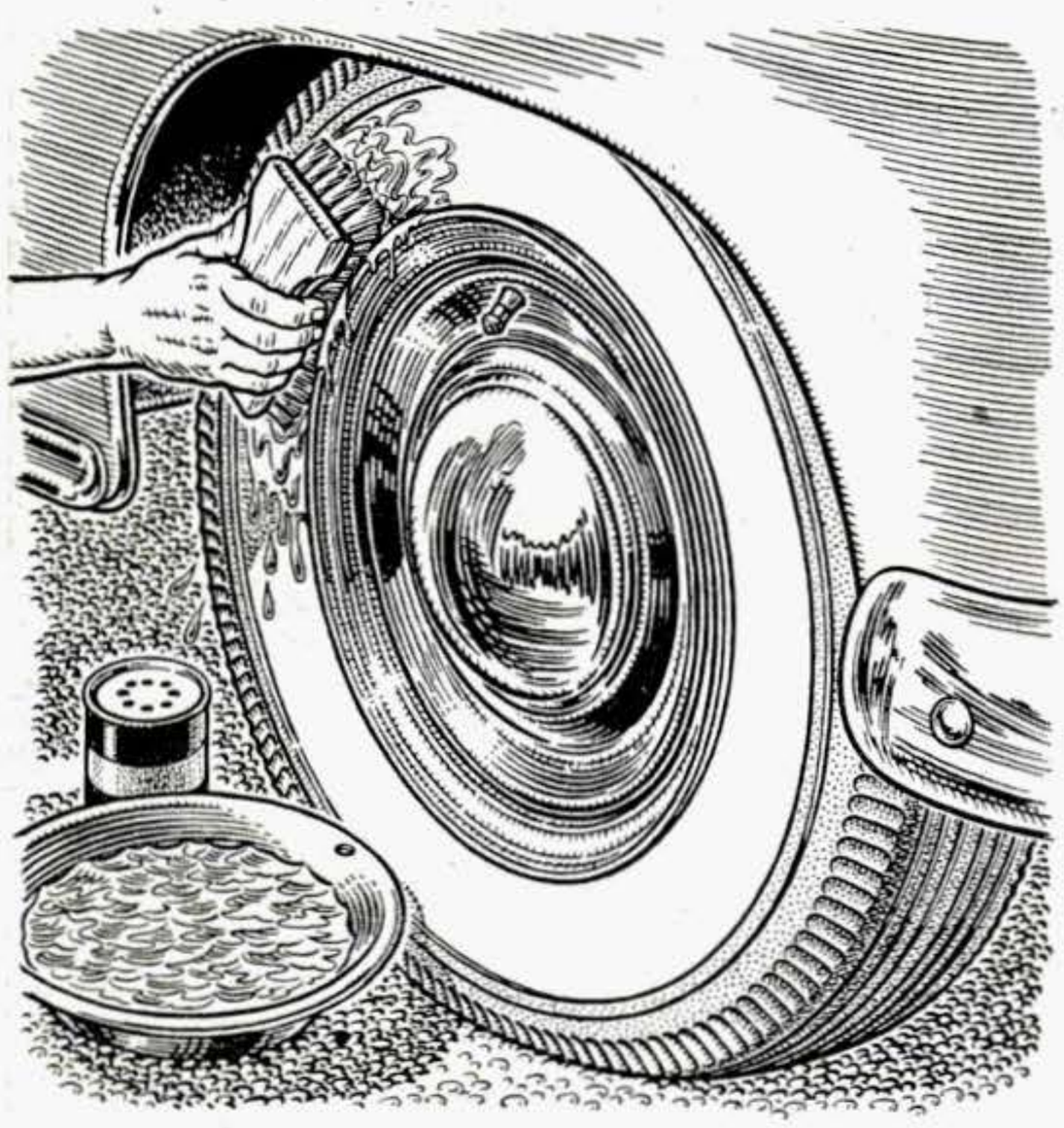
If you can't loosen a bolt holding a muffler or hose clamp and there is no space to use a hacksaw or chisel, try this: Drill a small hole through the side of the bolt and follow it with a bigger drill. Then twist the bolt off.



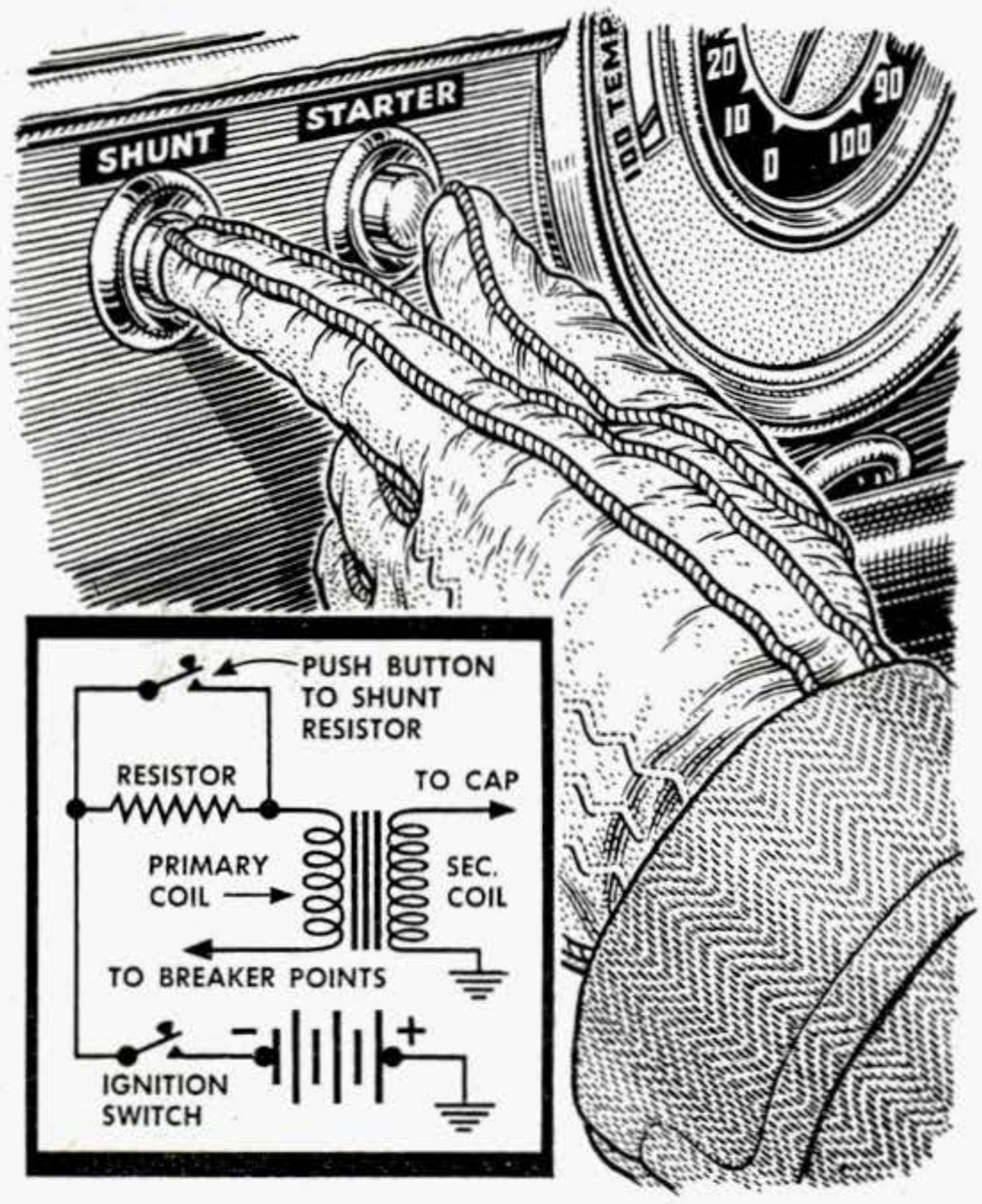
After your wheels are balanced, they'll look better if you paint the balancing weights the same color as the wheels. A small can of matching touch-up paint will do the job quickly. At the same time, touch up any marks or scratches on the wheels, too.

Please turn the page for more auto hints.

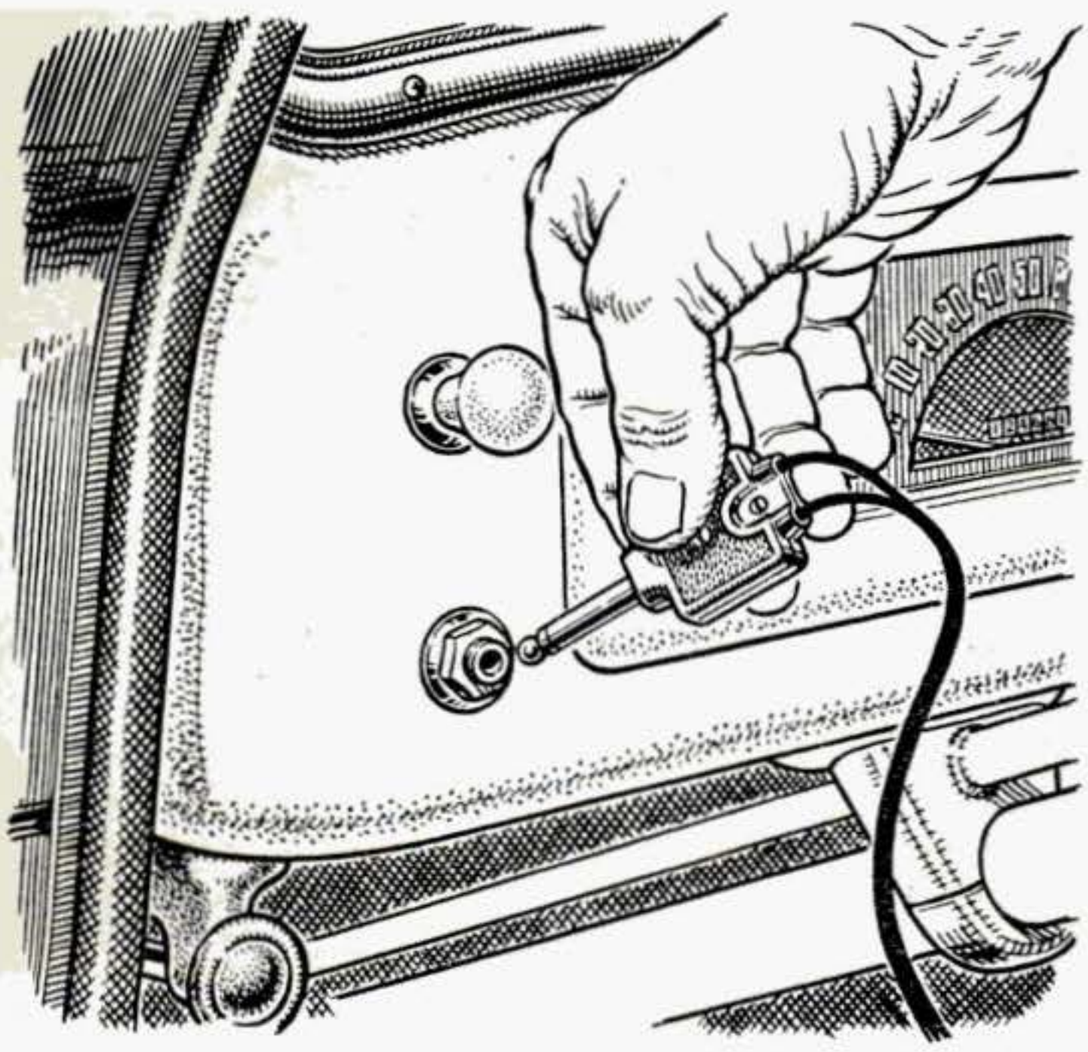
MORE Hints from the Model Garage



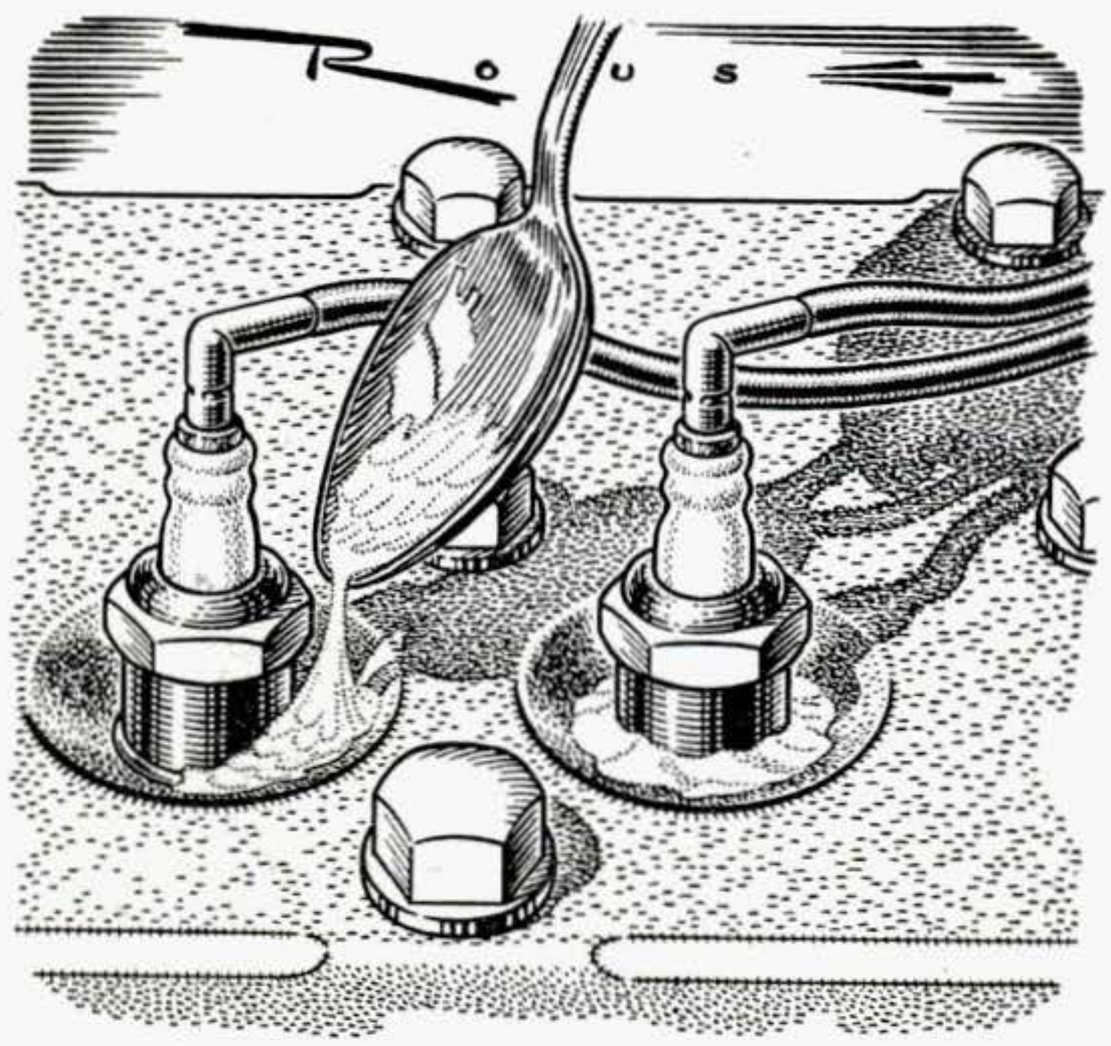
White sidewalls are waxed in the factory to keep the rubber from checking and cracking. Under a hot sun, excess wax may bleed to the surface of a new tire, a condition known as wax bloom. This excess wax should be removed with water, scouring powder and an ordinary scrubbing brush to prevent discoloration of the tire.



Hot sparks for cold starts can be assured with a setup like this. A Ford coil that uses a resistor in the primary lead is substituted for the regular coil. A normally off push-button switch on the dash is depressed at the same time you hit the starter. This by-passes the resistor, giving higher voltage at the coil input.



A phone jack of the open-circuit type on the instrument panel makes it easy to connect a home battery charger. Ground one side of the jack and hook the other to the ammeter. Be sure to polarize the charger leads when you connect them to the plug.



Compression leaks around spark plugs can be easily located by sprinkling a liberal amount of talcum powder in the wells and noting any powder disturbance when the engine is started. To eliminate leaks you find, tighten the plugs or replace the gaskets.

It's Easy to Tile a Wall

You can turn out a job like a professional with metal tiles and they are easy to keep clean.

By Jerry Parker

"YOU just smear some goo on the wall," my wife said, "and stick the tile to it."

"I still think it's a job for a professional," I repeated.

"Oh, it's not," she snorted. "Betty Williams did it and if she can, you can too. In fact, I can do it if you buy the tile."

The clock on the mantel struck midnight.

"I'm handy with tools," I admitted, "but I absolutely refuse to try to put up tile walls. And that's final."

We went shopping for tile the next day—another of my final statements turned out to be not so final.

We chose metal tile, a steel kind that sells for 55 cents a square foot. (Alumi-

TOOLS YOU NEED to set a professional looking metal-tile job are spread out here. They include a bending block, a grouting tool shaped like a pencil and a notched mastic spreader.

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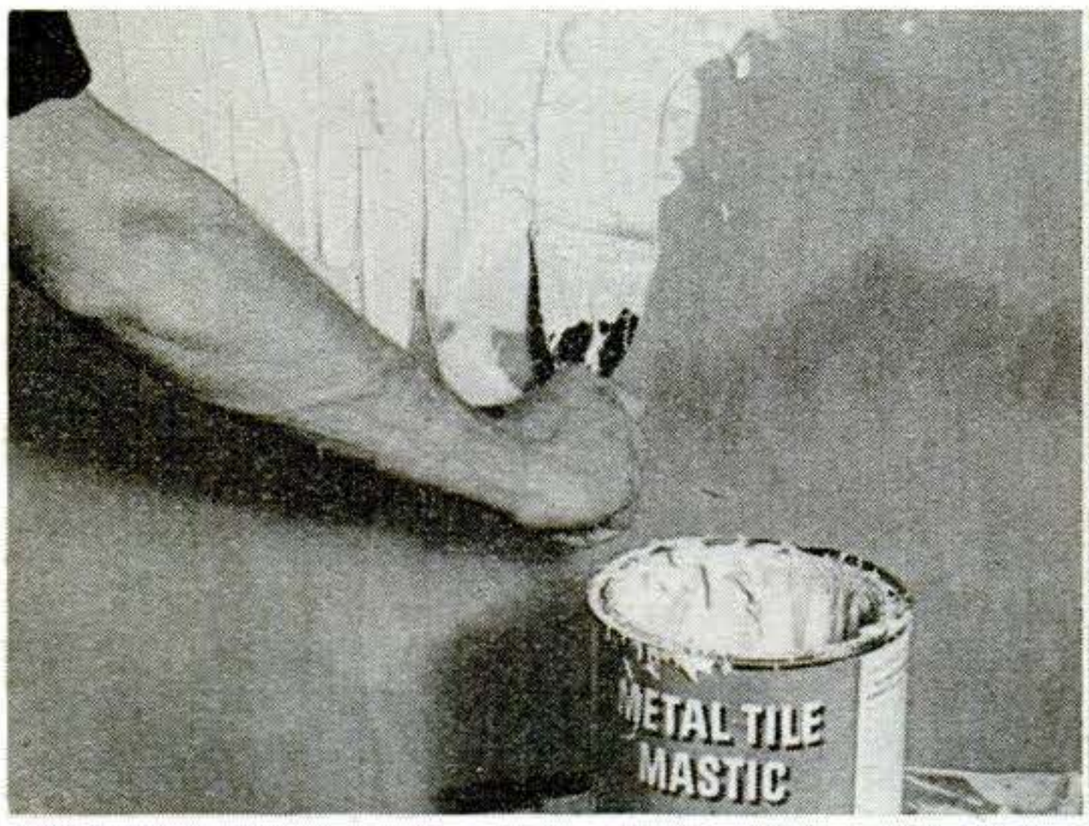
num tile would cost around 65 cents and stainless steel about $1.50. Sometimes you can get mill seconds at a lower price, for use in inconspicuous areas.) Metal tile comes in a wide range of pleasing colors.

Once we got going, I found that there's really no secret to setting metal tile. It can be applied to practically any kind of wall, including plywood, plasterboard and plaster. These tiles, which come in many sizes, can be cut and shaped with ordinary tin snips and a simple bending block. If you have any doubts, you can warm up by setting a few practice tiles on a scrap piece of plywood.

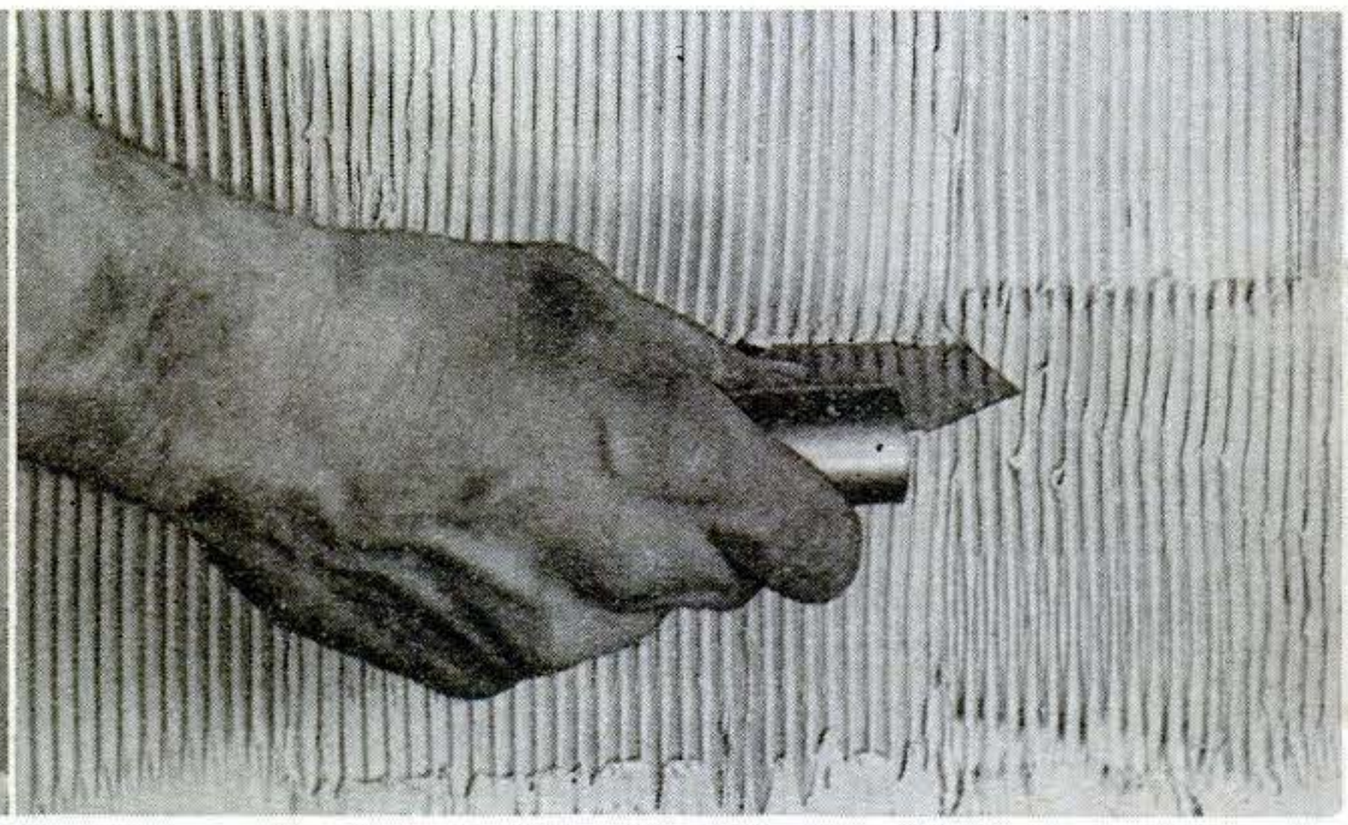
Accurate guidelines, one horizontal and one vertical, are important. Lay out the horizontal line somewhere between 48″ and 60″, picking a height that is a full multiple of the tile you are using. For instance, if you are using 6″ by 6″ tile you could put the horizontal line at 54″ above the floor. Then a course of nine full tiles would fill the area between the floor and the line.

If you must use a course of cut tiles on a wainscot job, the odd-size course should come at the floor. In tiling a full wall, however, set cut tiles at the ceiling.

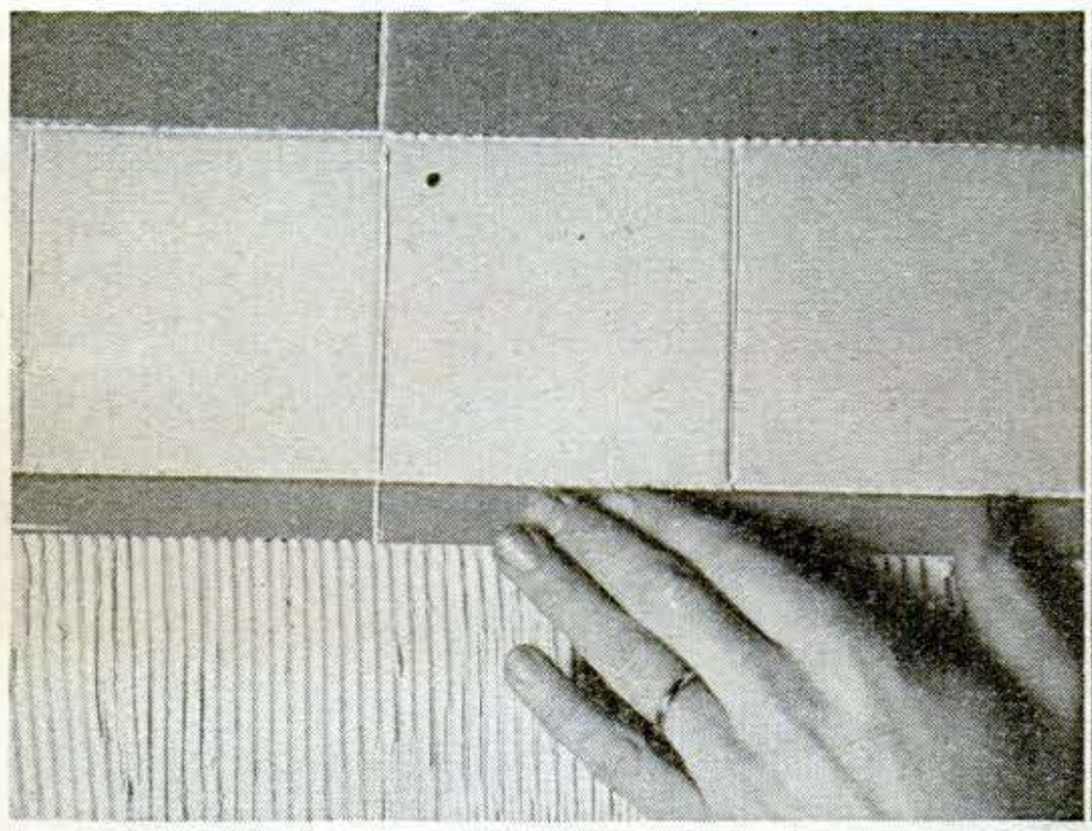
After you've drawn a vertical line in the center of the wall, measure to one corner. If butting the first tile against the vertical line means you'll need very narrow tiles—less than 1″ at the corner—then slide the first tile halfway across the vertical line.



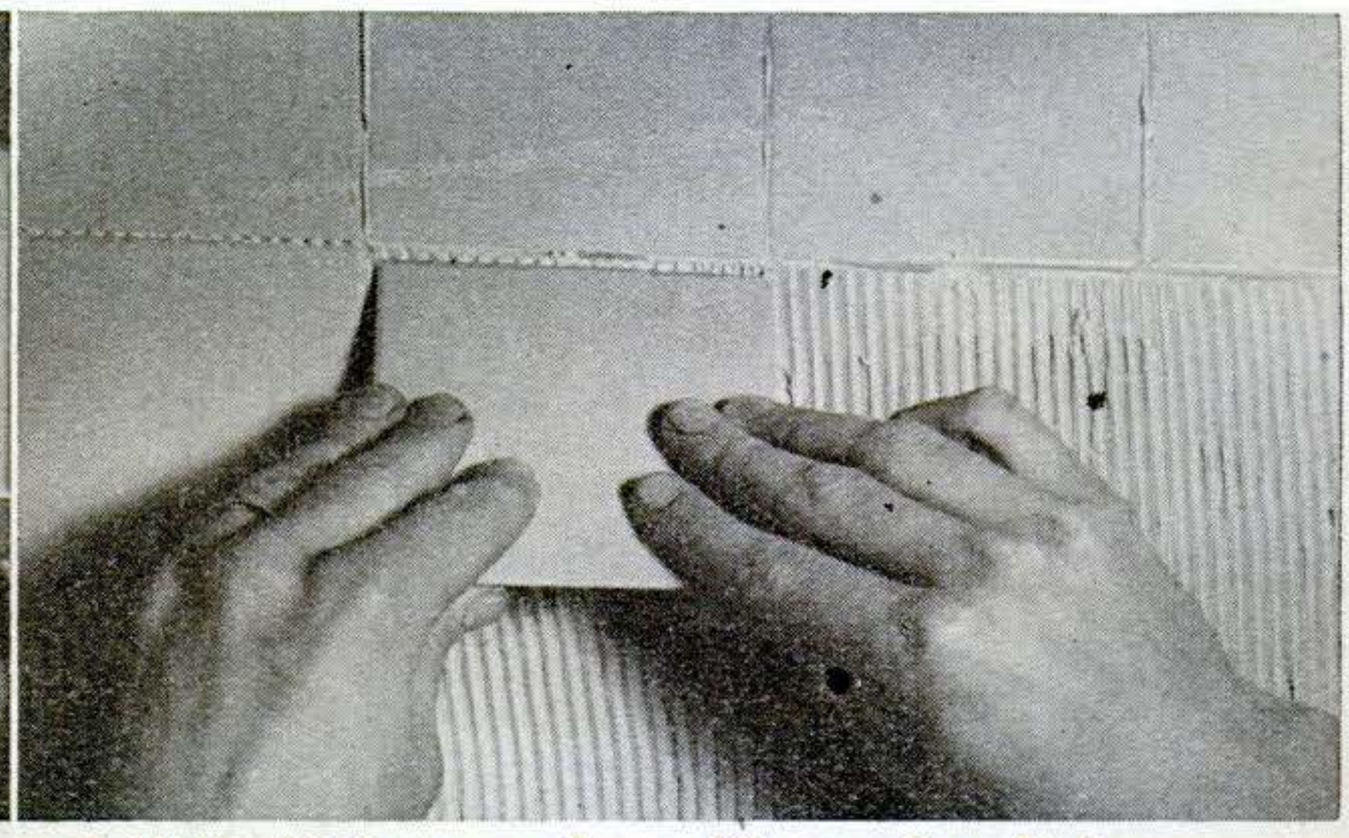
3 SPREAD MASTIC about ⅛″ thick. Don't cover area of more than 15 sq. ft. at a time and don't hide guide lines. Set tile on a day when temperature is over 60°.



4 STROKE MASTIC to proper thickness with notched spreader held at 90° to wall. Spreader removes excess mastic and levels peaks and valleys. Add mastic as needed.



7 FEATURE-STRIP TILE as well as a chair rail is used on many wainscot jobs. Feature strip is made up of long narrow tiles. Other trim tiles: cove base, border block, half tiles.



8 SNAP TILES into place. Place edge ⅛″ from tiles above and beside it. Snapping forces air from under tile and helps make better bond with the mastic.

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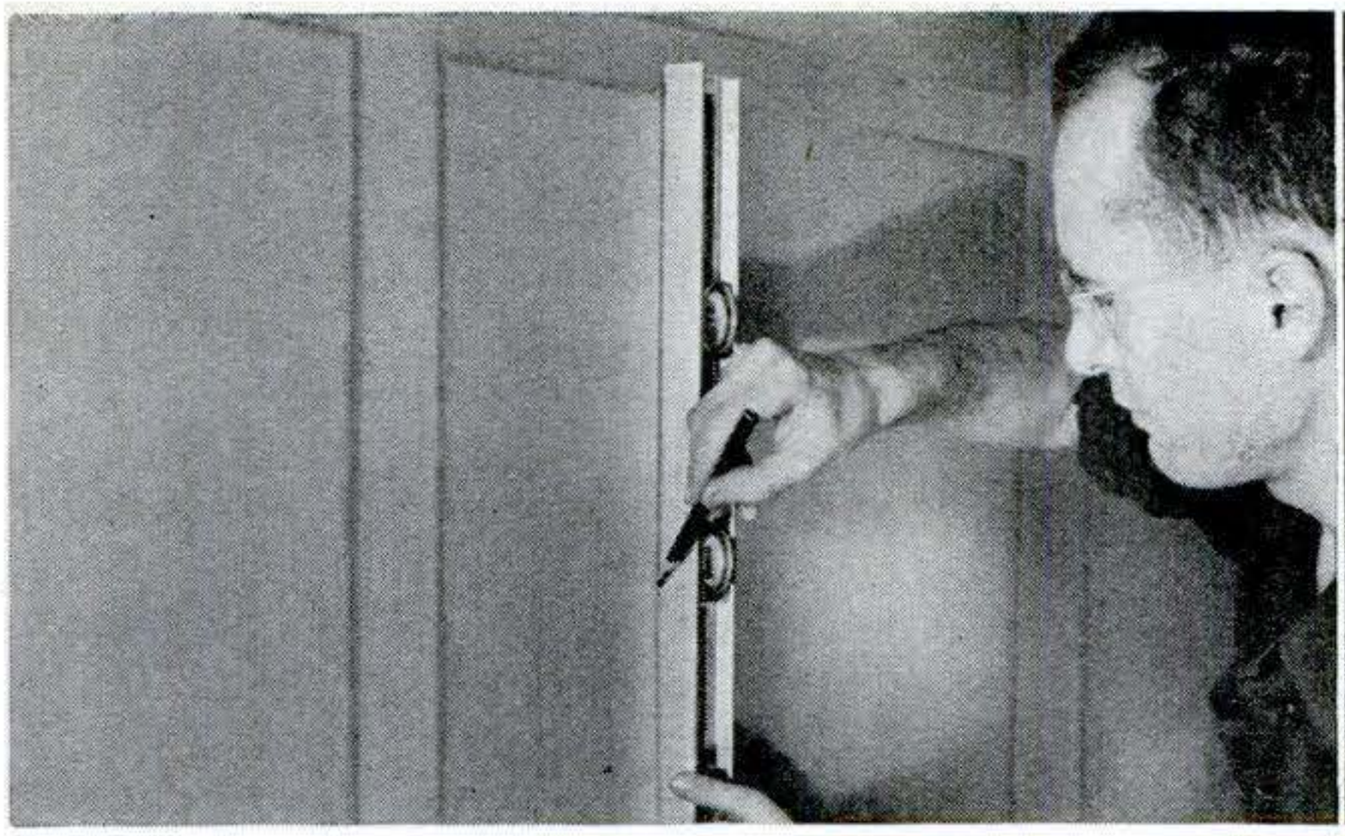
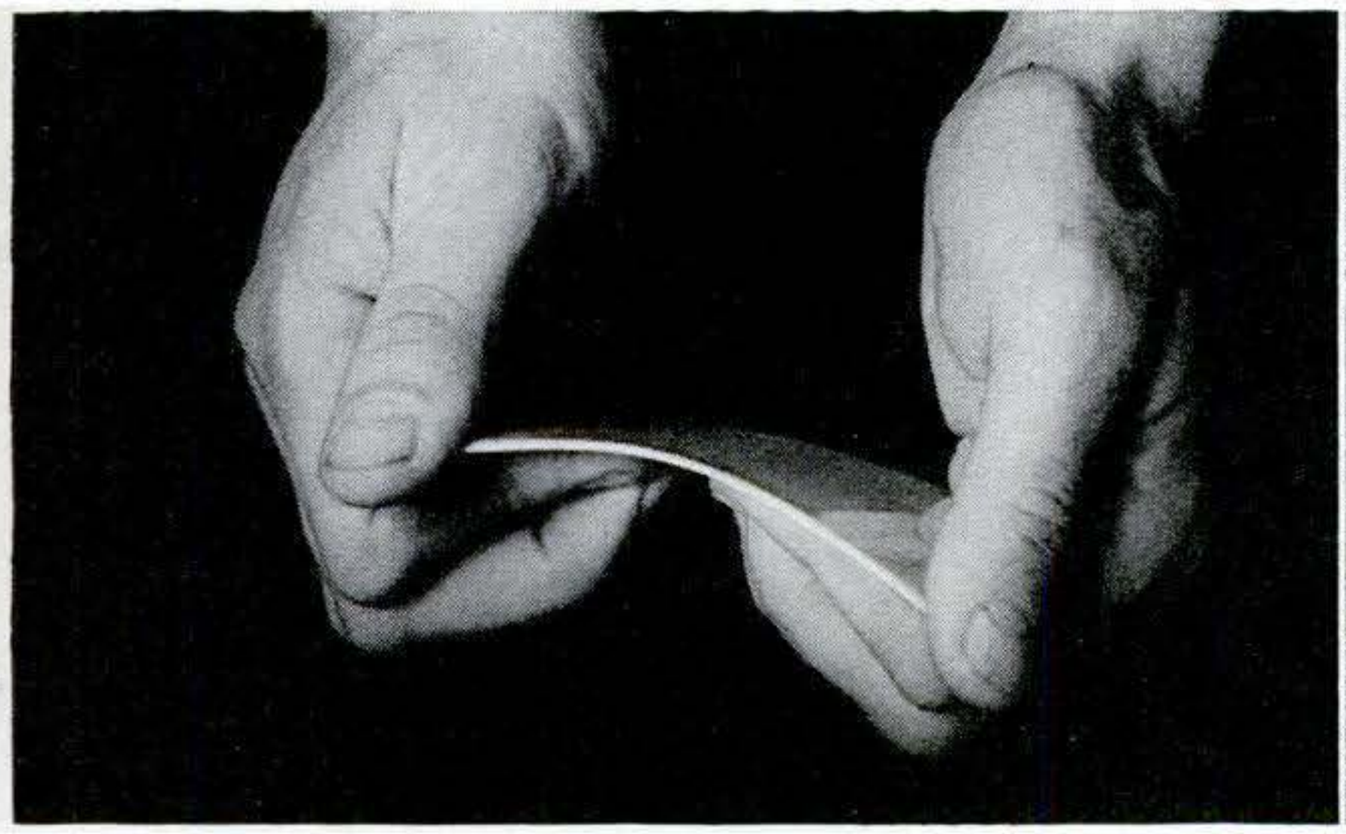
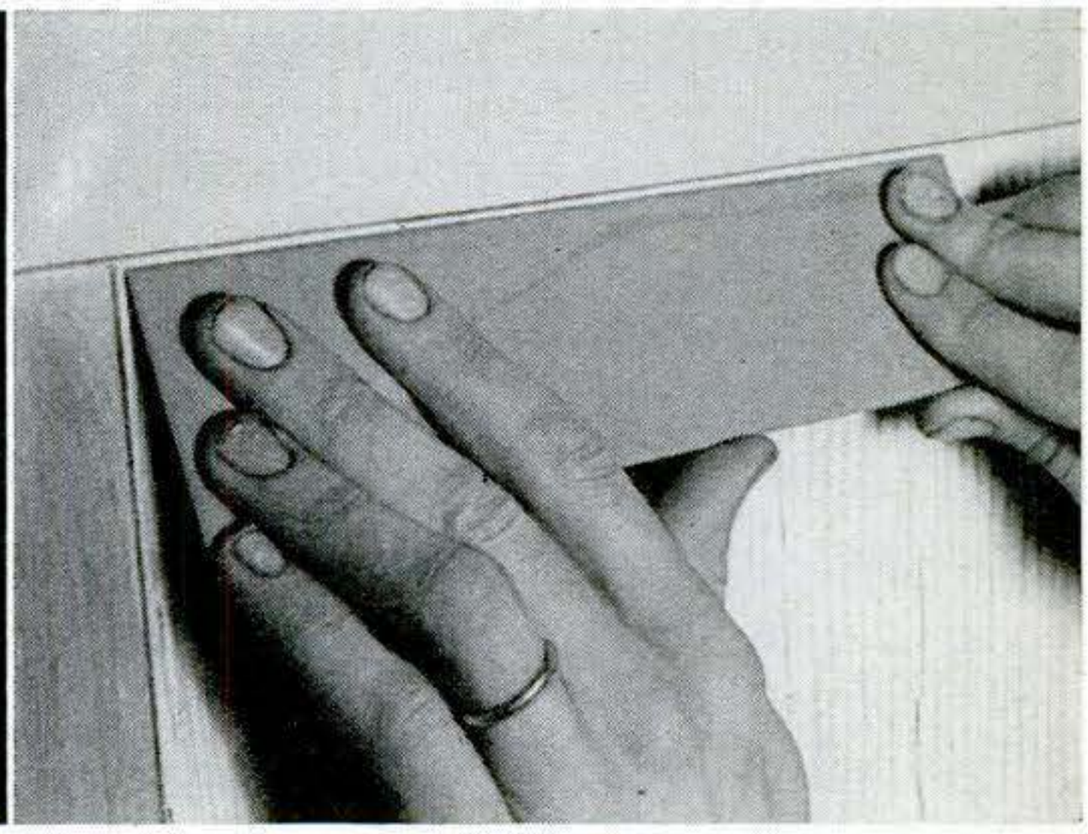


DRAW GUIDE LINES on each wall. Horizontal line locates top of first course of tile. Measure from corner to corner and draw vertical line at center of wall.

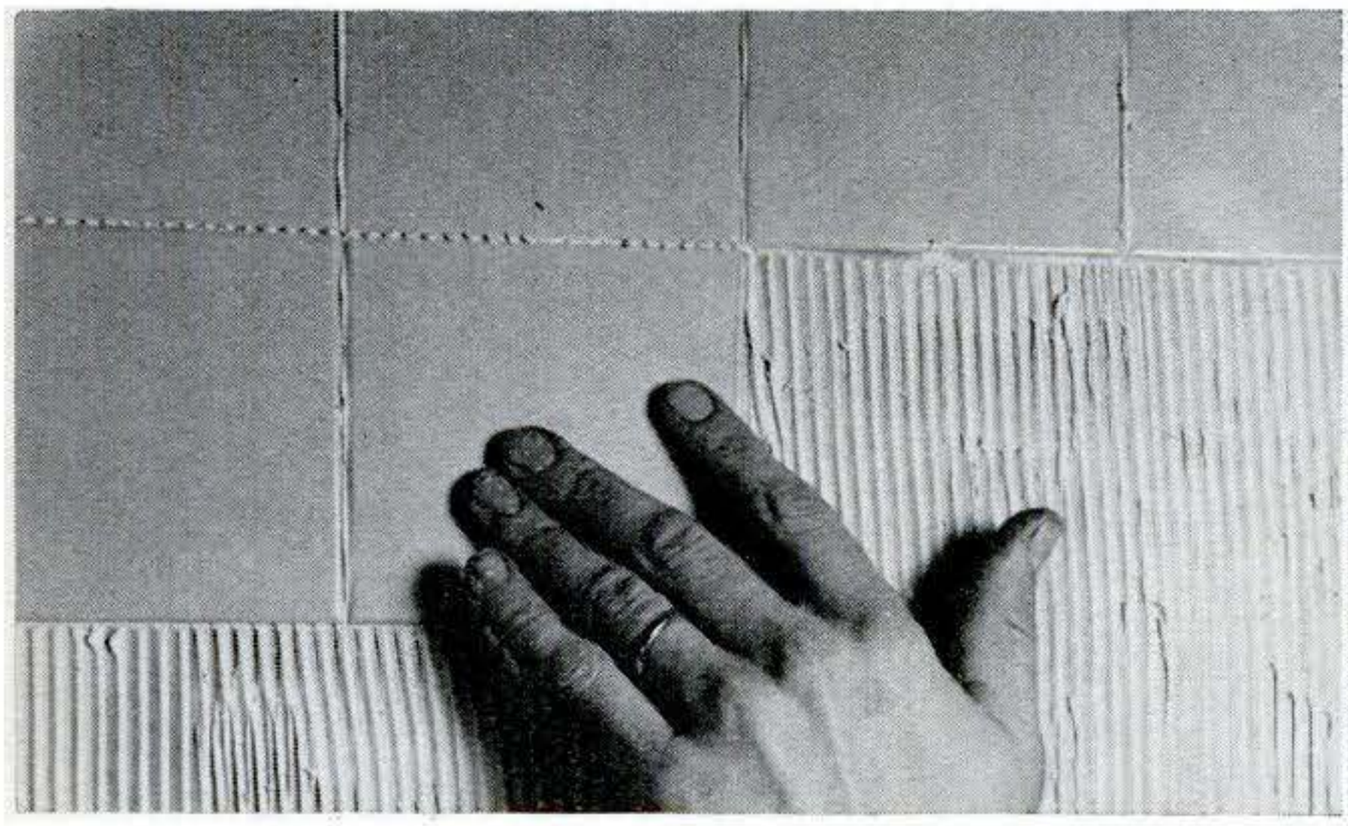
SIZE SURFACE with 3-lb. cut shellac. Walls must be clean, dry and crack-free. Sizing prevents oil from being withdrawn from mastic and maintains its adhesive quality.



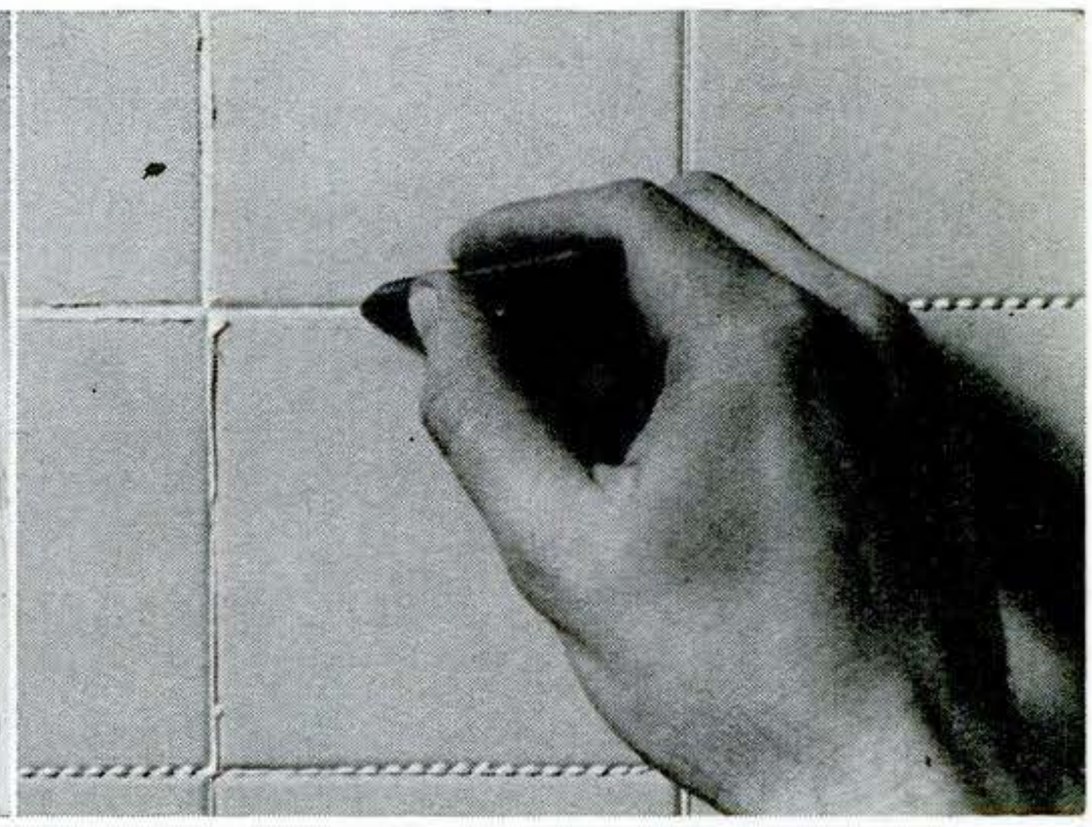
FLEX EACH TILE at the four corners just before setting it. Flexing prevents corners of tiles from sticking up. Be careful not to kink tiles with excessive pressure.



PLACE FIRST TILE at junction of guide lines. In most wainscot installations, first course usually is trim called a chair rail (above). You can start on either side of vertical line.



SLIDE TILE firmly but gently into place against adjoining tiles after it has been snapped against wall. Thin bead of mastic that oozes from joints serves as grout.



GROUT JOINTS with pointed wooden tool, pressing mastic into bevel between tiles. A 1/16" line of mastic in bevel is desirable. Then smooth joint with damp finger.

Please turn the page for more tile photos

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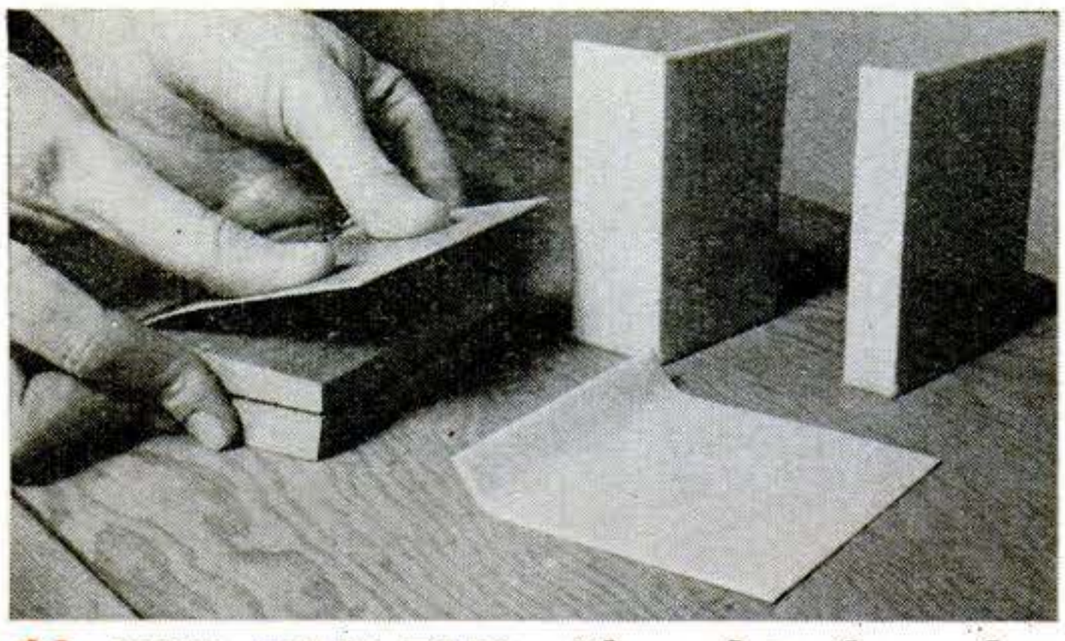
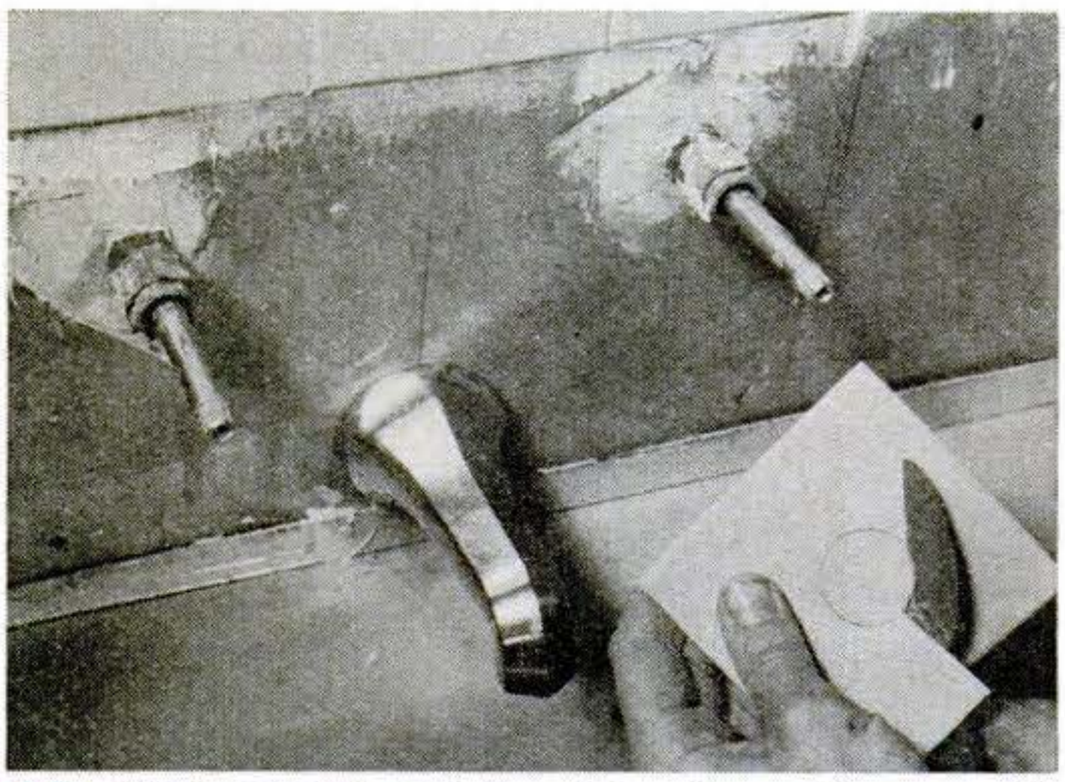
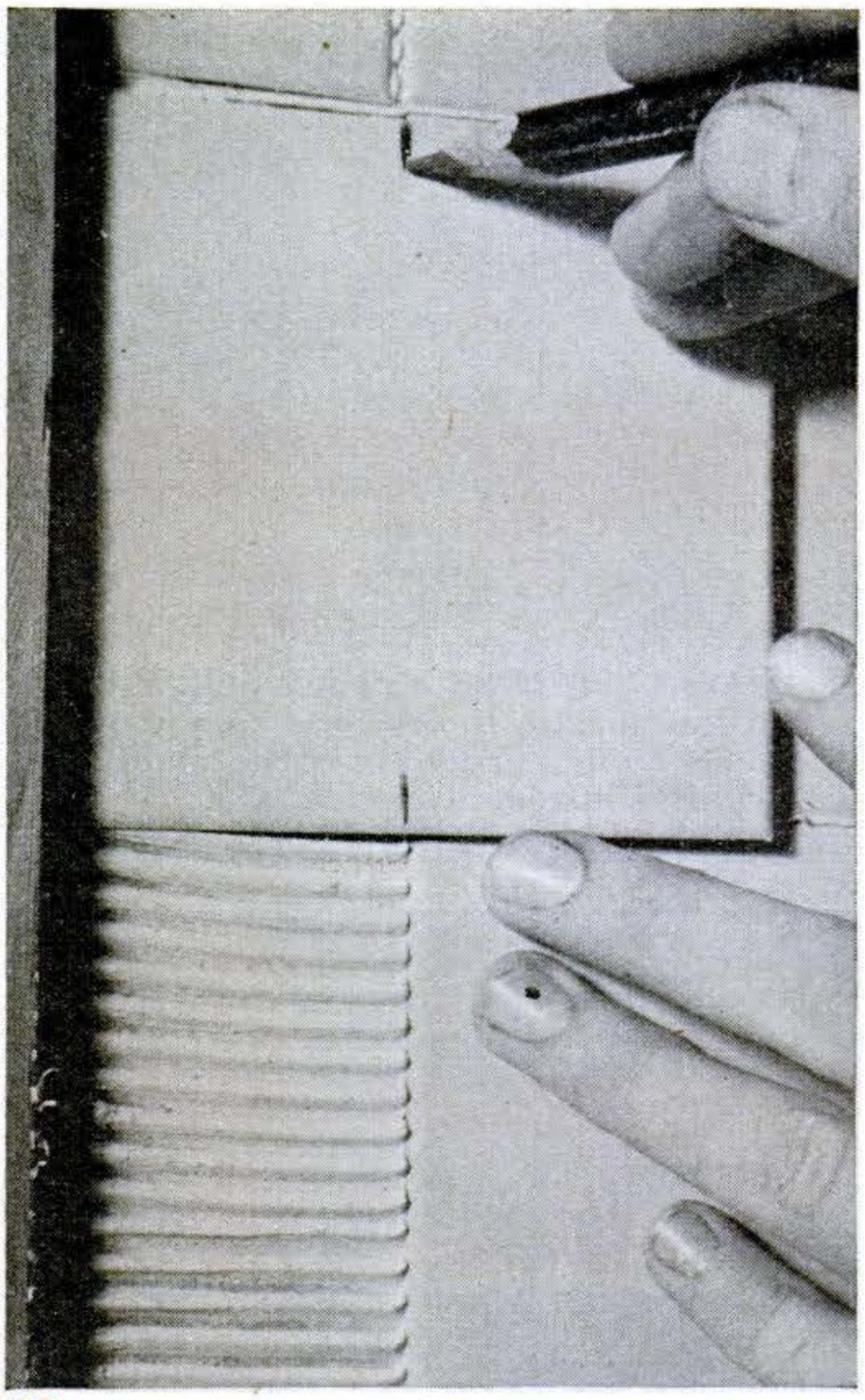


11 **BEND METAL TILES** with a slotted wooden bending block. Tiles may be shaped to fit inside and outside corners, tops of bathtubs or counters, to meet doors or windows.

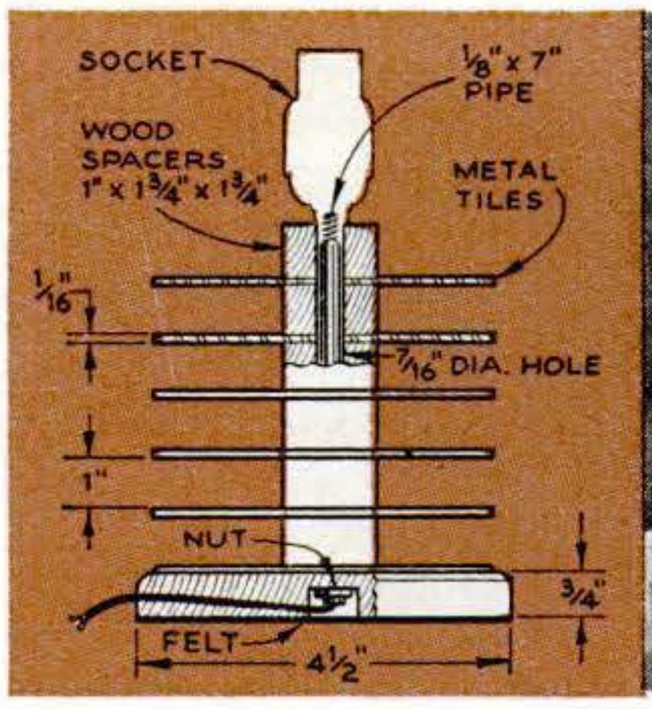


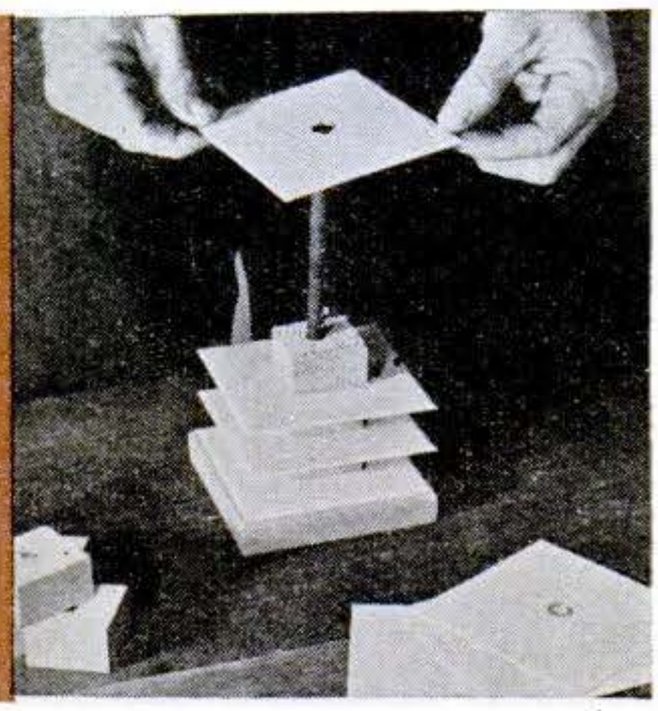
12 **CUT METAL TILES** with tin snips to fit around pipes. Light oil on blades eases cutting. Such cuts usually don't have to be precise since flange on fixture conceals them.



13 **MARK EDGE TILES** for cutting with a pencil like this. Then use straightedge or another tile to connect pencil marks. The snips will do the cutting and marks wipe off.

Leftover Tiles Can Be Turned into a Modern Lamp





WHEN you've finished a metal-tiling job, you can use those extra tiles to make a modern lamp like the one at left.

Cut the spacer blocks in a miter box to be sure they all are square, and drill them for a piece of pipe. Clamp the tiles together and drill them all at once. Finish the blocks before assembling the lamp. *—Victor H. Lamoy, Upper Jay, N. Y.*

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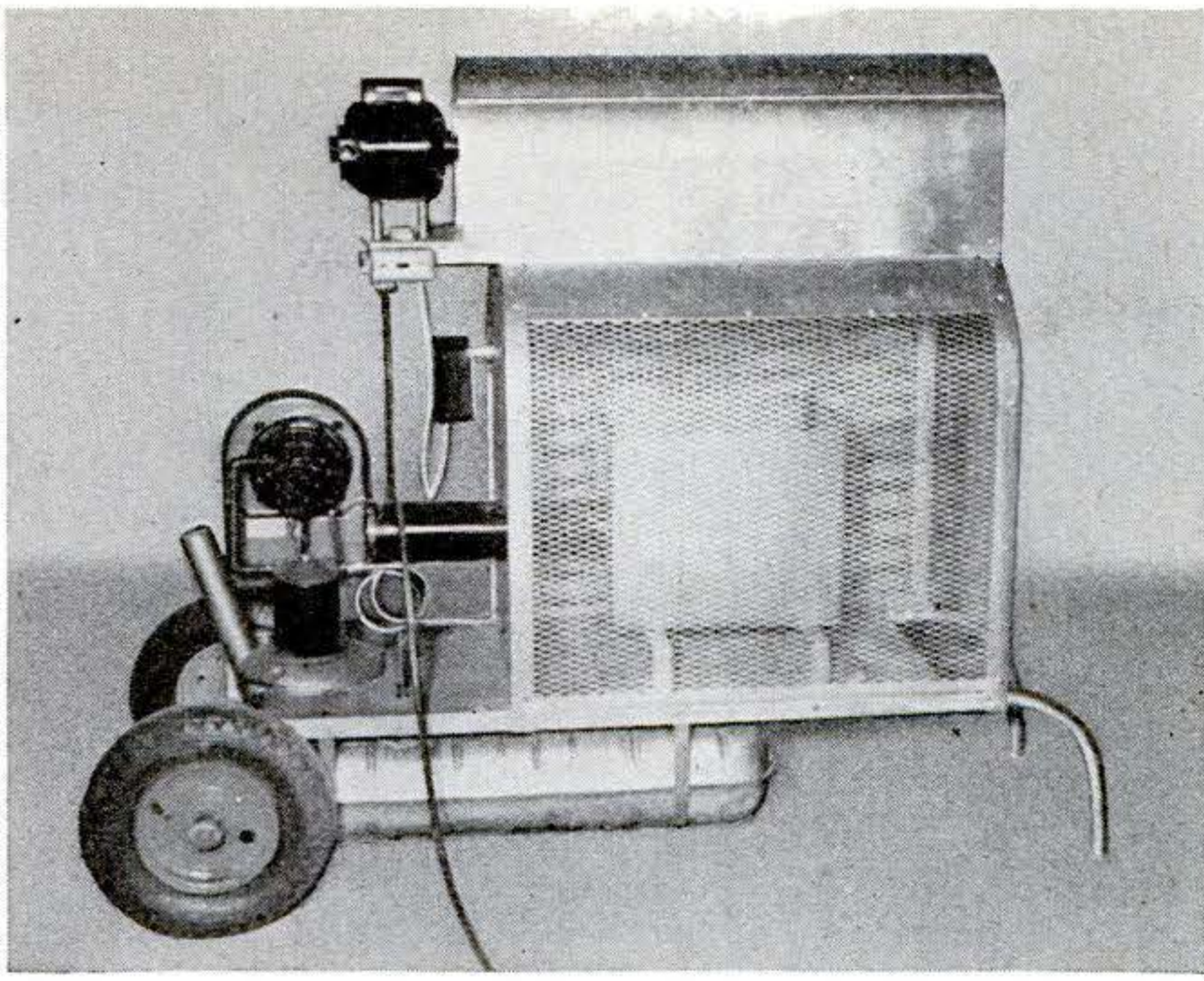
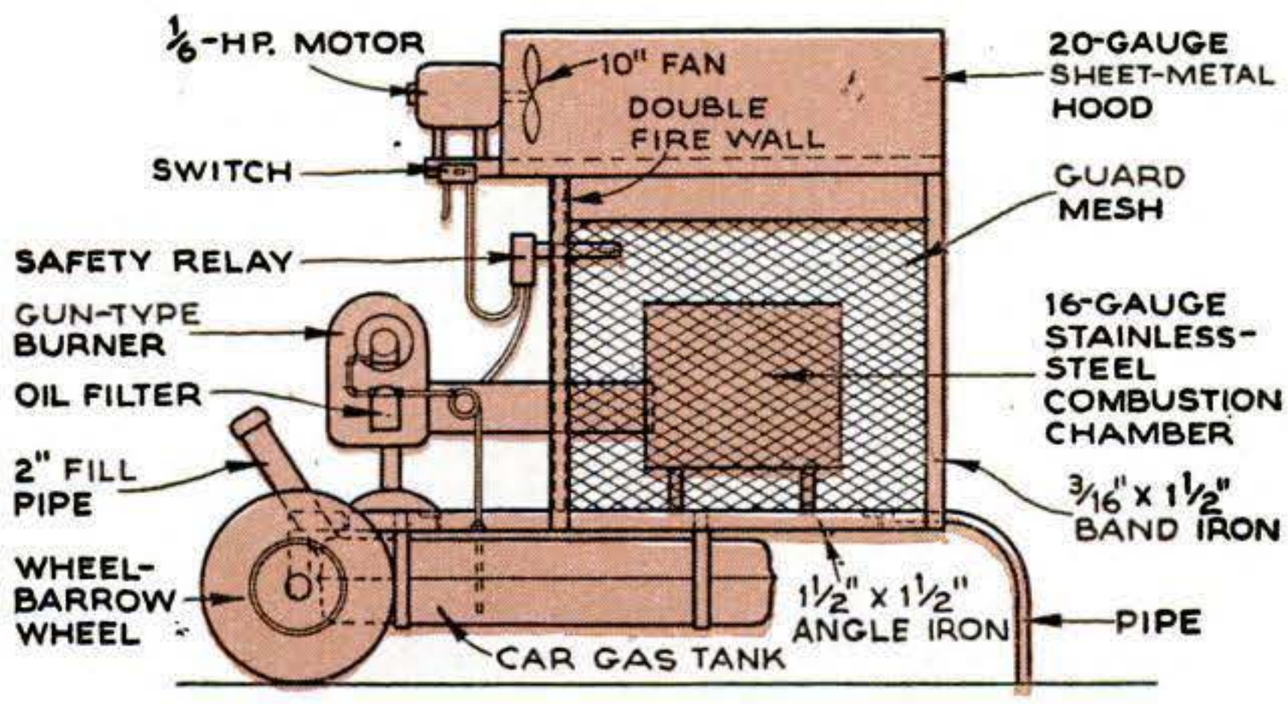
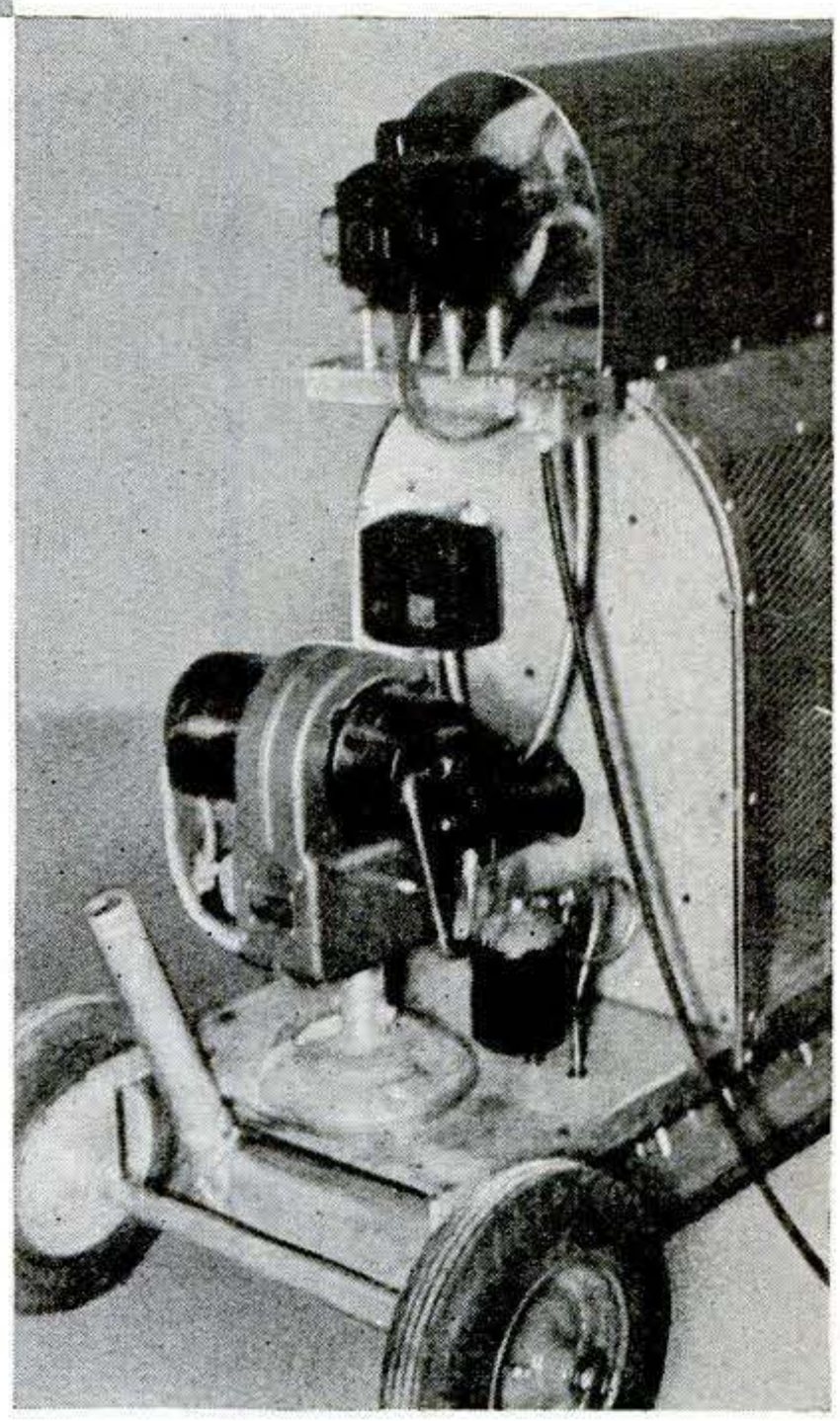


Oil Burner on Wheels

Puts Heat on Construction Jobs

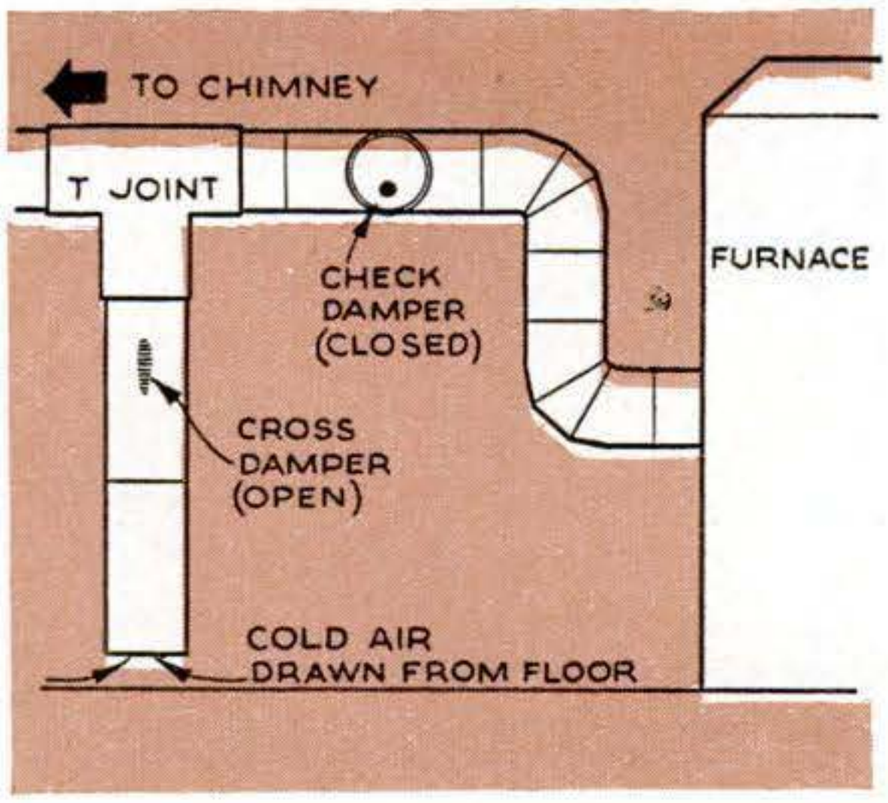




THIS homemade portable heater was built to warm men and materials on construction jobs during the winter. It can be used wherever electric current is available to power the gun-type oil burner.

A hooded blower on top shoots the heat where it's wanted. An automobile gas tank has enough capacity for overnight operation. If equipped with a thermostat, the burner could operate unattended.

Robert J. Huelsbeck, Menasha, Wis., built the burner at a cost of about $250. The over-all length is 68", width 37" and height 54".



Extra Pipe Helps Warm Basement

MY BASEMENT workshop became noticeably warmer in winter after I installed a T joint in the furnace flue and ran an extra pipe almost to the floor to substitute for the check damper.

I now keep the regular check damper closed. This forces chimney suction to draw air through the extra pipe. Thus, cold air from the floor goes up to the chimney instead of the warm air that previously was lost. Because I have a long run of flue pipe, it also remains warmer and helps a bit with the heating. A cross damper closes off the down pipe when necessary.—*E. A. Storey, Sarnia, Ont.*

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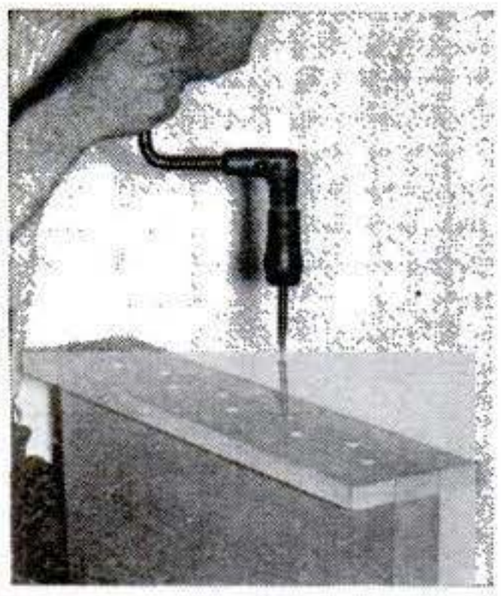
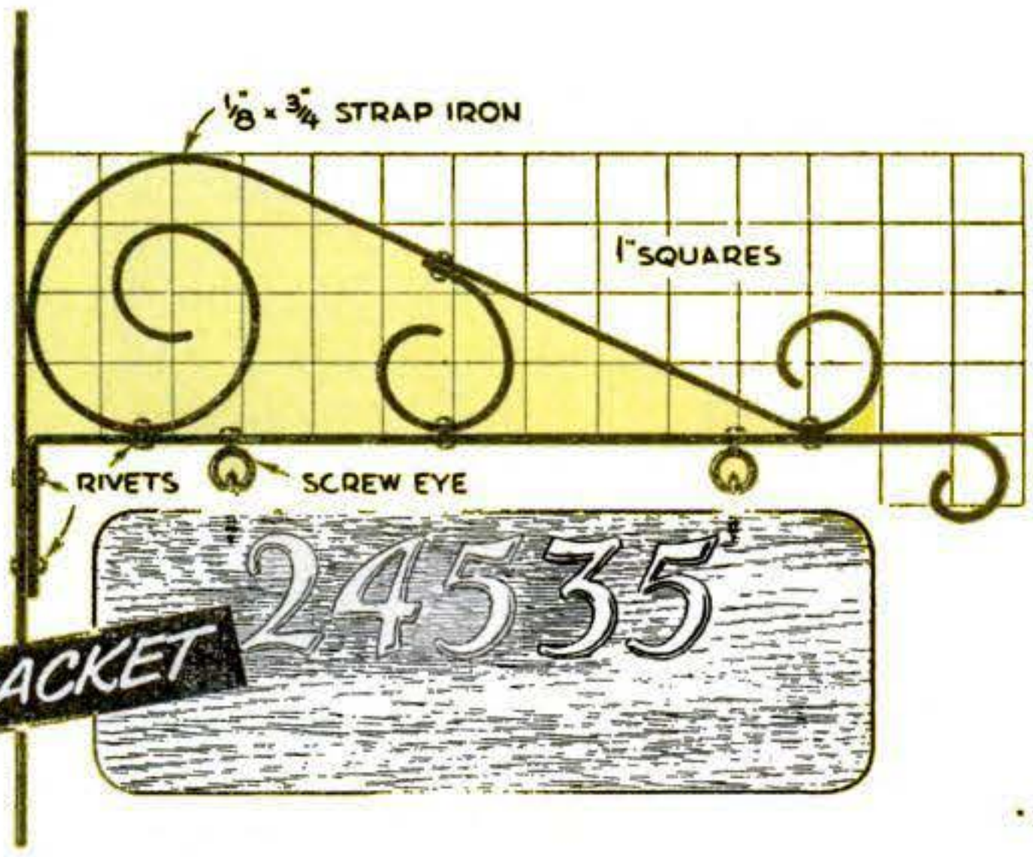
One Evening Shop Projects

COFFEE TABLE

It looks like a custom-built table, but it's really only four pieces of wood and a solid-core flush door put together with screws. Two pieces of 1″ by 5″ by 22″ pine are fastened (right) to the 2″ by 16″ by 22″ legs, made up of edge-glued stock. Then the 1″ by 5″ pine pieces are screwed to the door. Drill ¾″ into the door for these screws and use 10 screws to hold the 1″ by 5″ pine to the legs and 10 screws to hold the pine to the door. I finished this table by wiping on and off a coat of white paint and, when dry, following it with several coats of spar varnish. I sanded between coats of varnish and ended with a coat of wax.—*E. L. Britt, Westport, Conn.*



SIGN BRACKET



A graceful bracket for house numbers can be curved from a length of strap iron, using a vise and a large wrench. Strap iron ⅛″ thick can be bent cold. Make a full-size pattern first from the squares so that you can check your bends as you go along. The wood on which the stock-aluminum house numbers are mounted can be edge-glued pieces or a rectangle of waterproof plywood. —*Hi Sibley, Nuevo, Calif.*

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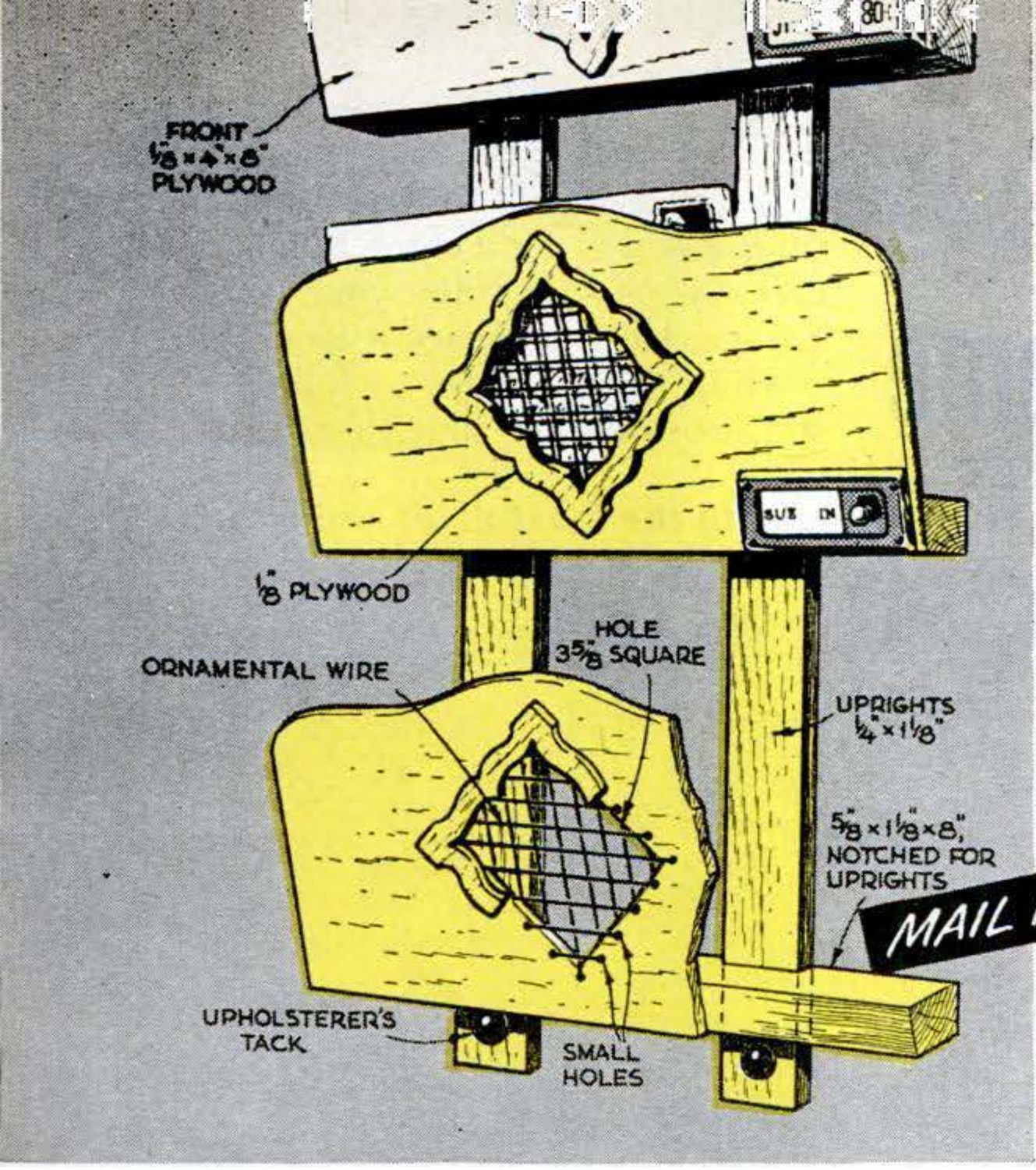

Who's home? Any member of your family can glance at this mail rack and tell if other members are out or not. It's especially handy by a front-hall phone. The in-and-out gizmo is merely a metal name-plate frame with a thin sheet-metal slide. The knob on the slide can be a piece of rod, dowel or a knob sawed from a hinge pin. I used the latter and riveted the knobs to the slides.

The wire mesh in the fronts was made by drilling small holes around the openings and threading fine wire through the holes. A frame of 1/8" plywood glued to the fronts conceals the holes.

I used upholstery tacks to conceal the screws that hold the rack to the wall. The screws were set in a block and then drilled to take the shank of the tacks.—*Bertram Brownold, Cedarhurst, N. Y.*

Shelves for magazines make this clean, modern table doubly useful. Assemble it from four pieces of 3/4" by 10" by 16" plywood and two lengths of 3/4" by 7" dowel. Drill 3/4" holes about 1/4" deep in the three shelves for the dowels. The center shelf, of course, takes a hole on each side.

Center the holes about 2 1/2" from one end of the shelves. Then screw and glue the shelves to the back, glue in the dowels and the table is ready for painting.—*M. S. Schroeder, Mundelein, Ill.*

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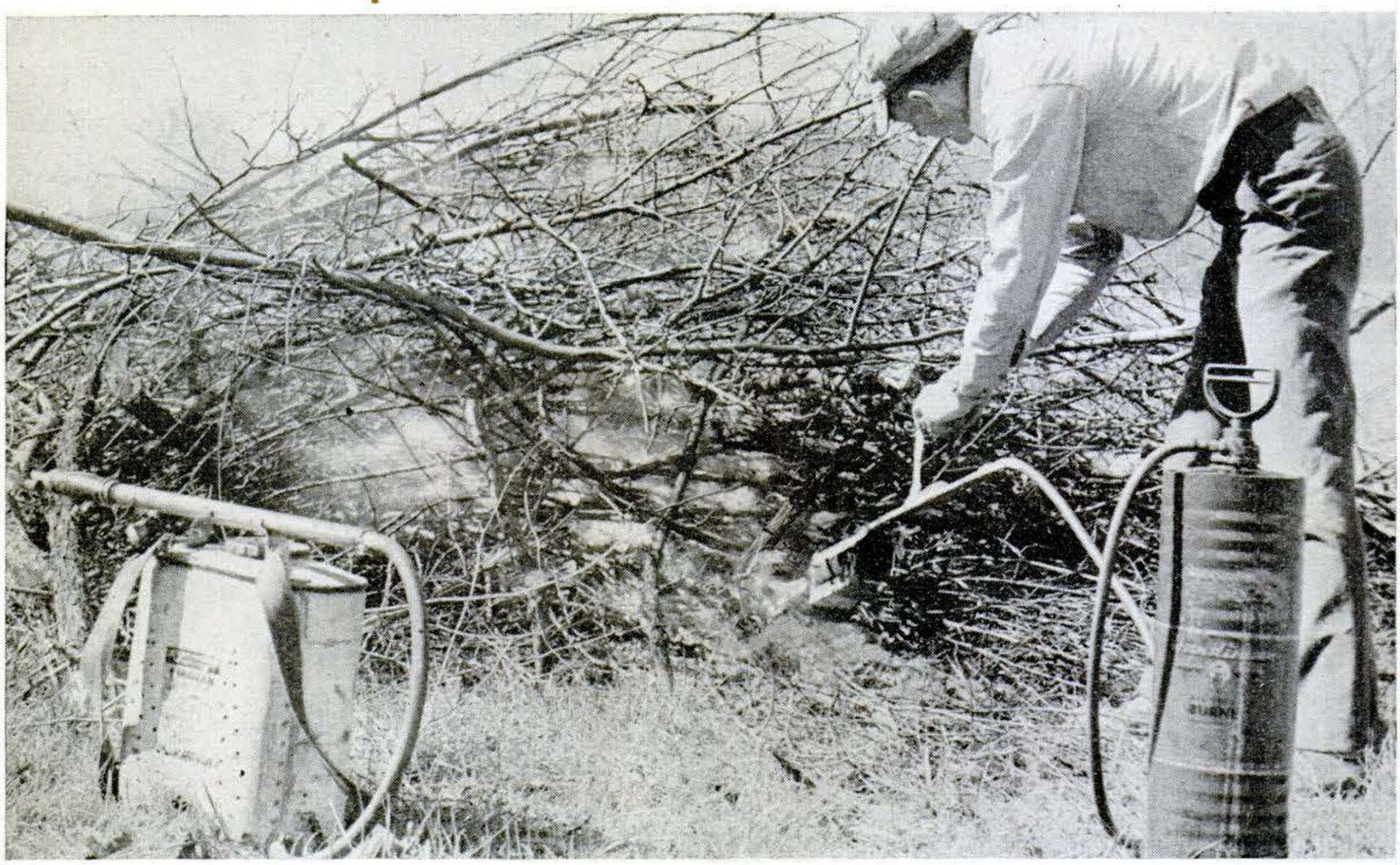
How to Burn Brush and Not Your Home

BURNING brush is one of those necessary jobs that gardener and farmer alike face from time to time. But it is not a chore to handle carelessly if you value your home, garage, barn or adjacent wood lot.

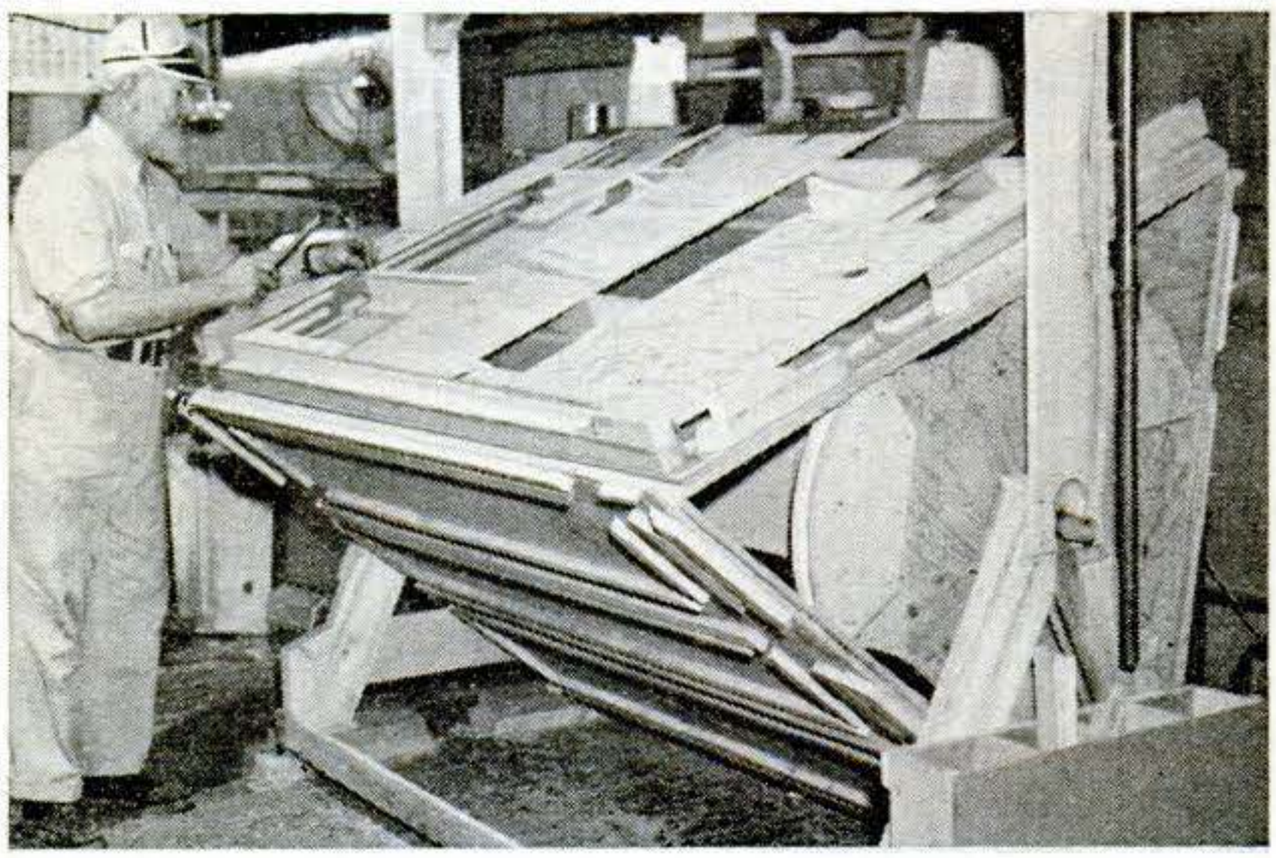
Here are the rules to follow:

- Choose a safe spot that is also

Follow these six rules and you'll get the chore done with the least grief and effort.



GREEN BRUSH IS NO PROBLEM if you use a flame thrower to get it started. Turn its 2,000° flame into the bottom of pile. In a few minutes its job will be done. A pack-pump sprayer filled with water (left) makes short work of any stray sparks or flames.



Jig Saves Space

ABOUT two-thirds of the space required for assembly jigs was saved when this three-sided rotary unit was put to work in the shop of Trotwood Trailers, Inc., at Trotwood, Ohio. It has three flat work surfaces mounted on a revolving drum. A bar through holes in the drum and the support members will lock any one of the work surfaces in the most convenient nailing position, anywhere from vertical to horizontal.

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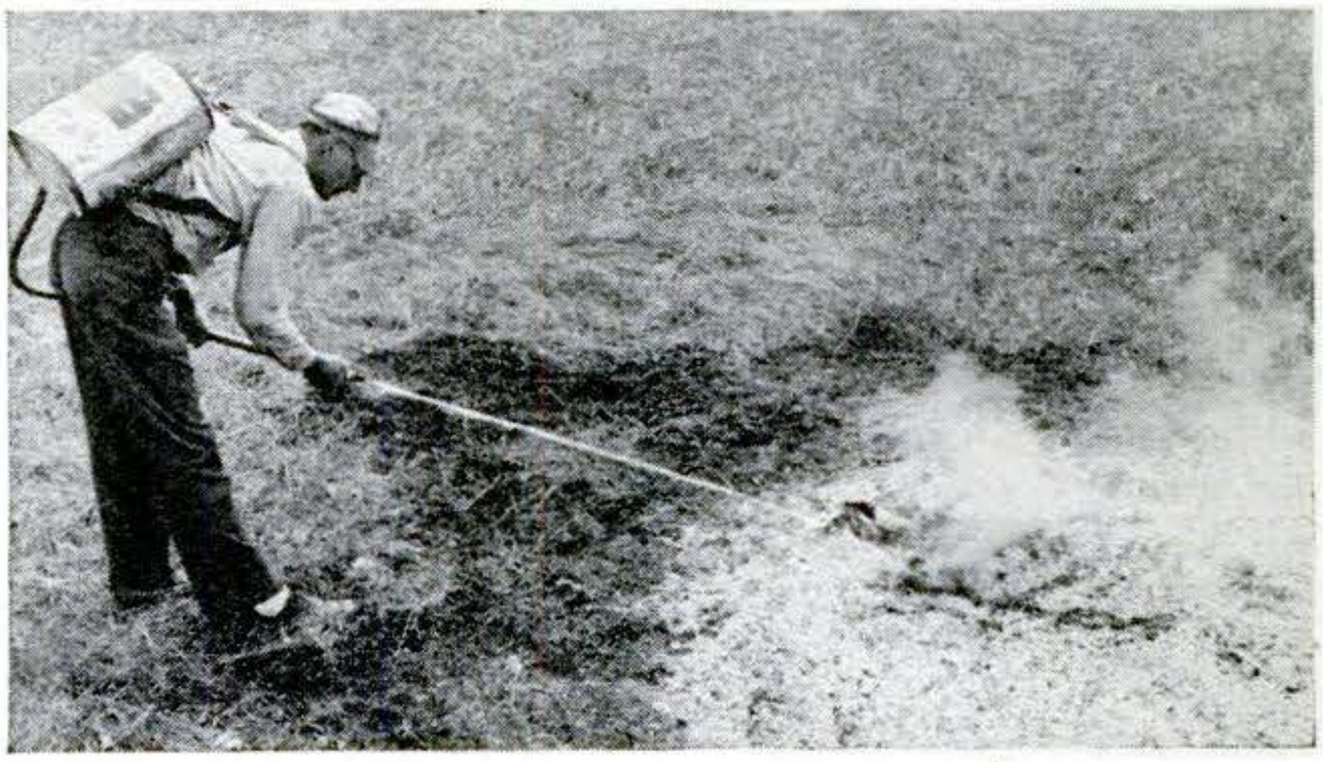
convenient. It should be out in the open—as far as possible from buildings.

- Wait for the right weather. Don't burn on a windy day. Most states forbid open fires in times of drought. After a rain is the best time. Don't worry about the brush being too wet or green; it will burn on a hot starting fire.
- Keep the pile small and feed more brush to it after the fire is going. Rake dead grass away from the site to provide a safety belt. Use the rakings as kindling.
- Have a broom or spade handy as a fire swatter. Pounce on any sparks or trickles of flame that cross the safety belt. A pack-pump sprayer filled with water makes a good stand-by fire extinguisher. Able to throw water 30 feet, this sprayer is a valuable tool for any homeowner.
- Starting the fire is a cinch even with green brush if you use a flame thrower. Its 2,000° flame can also be used for weed killing, disinfecting, rock splitting and winter thawing. Lacking one, kindle the starting fire with dry brush. Be very cautious with gasoline or kerosene.
- Before night, wet down the ashes with a few gallons of water. Be sure the fire isn't a sleeper, hiding in the turf.

HOT EMBERS will keep the fire going as long as you feed it fuel. As the heart of the fire burns down, push any unburned ends into the center.

RAKE THE ASHES from time to time until everything is completely burned.

WET DOWN ASHES before night. Next day scoop up the potash-rich ashes for garden fertilizer.



Window Shade Matches Walls

WHEN a kitchen or bathroom is papered with a washable wall covering, save vertical pieces that are as big as the window shades. Replace the window shades with the pieces of wall covering, stapling them to the present rollers. Use the shades as patterns.—*Robert Hertzberg, Jackson Heights, N. Y.*

Workshop Wisdom

To the roster of men we once knew
Must be added the name of Jim Pugh,
He installed a new switch
With the juice on, and twitch!
The fuse went and so did Jim too.

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How to Bounce Light

Aiming your photo lamps at a white ceiling instead of directly at the subject produces even illumination without distracting shadows. Any home cameraman can use the trick.

MAMA'S ARMS could break and baby could lose interest in the game if papa must take time to shift and balance his lights for artistic effect. But when light is reflected off ceiling, as above, mama just hoists baby, both react, and papa clicks shutter. No time for anyone to tire.

UNTIL a short time ago it was almost impossible for an amateur to shoot good indoor photos unless he was willing to turn himself into an expert on what lights to use and where to place them. To do this really well is so difficult that Hollywood cameramen draw a thousand a week or more for knowing how.

By Ralph Steiner

But now an easy way of making pleasing indoor pictures has floated over the photographers' horizon. It is called bounce light. This means that you point your lamp or flash at a white ceiling or other large flat white surface and reflect the light rays toward your subject.

The results are magical. Bounce lighting irons out a number of problems at once. It is easier on the eyes—no squint from glare. It is easy to use: you need only one strong light source and you can hardly place it incorrectly. You don't have to change the position of the light every time your subject turns his head up, down or sideways. It gives pleasant, soft, naturally flattering results. It fills up the background so that homes don't look like caves.

THREE PEOPLE were a lighting nightmare before the age of bounce. In this case, good lighting on girl from a lamp at right would have meant back-of-head lighting on boy and a weird nose shadow on girl facing forward. Bounce light makes it no problem at all.

Shadows Are Soft and Pleasing

Why should bouncing a light make this difference? First, the rays that come directly from a bulb backed by a reflector have a comparatively small source and therefore they give a sharp-edged shadow. Bounce light has a source many times larger—the lighted spot on the ceiling. This gives soft-edged shadows which are more pleasing and much easier to use. A hard-edged shadow of a nose crossing a cheek has to be located exactly or the result can be ugly or ludicrous. A soft-edged shadow is almost foolproof.

Then too, direct light from a reflector and bulb comes out in a narrow beam. It is confined to the area of the subject. Little leaks out of the subject area to reflect back and fill the unrelieved black of the shadows. But light from a flat-paint ceiling shoots off in all directions and fills the whole room. Unless you have very dark walls, enough of it reflects back helpfully to prevent coal-black shadows.

For the best in bounce lighting you must have a white ceiling —the whiter the better. If your ceiling isn't white, you'll have to try a substitute. I sometimes use a large white illustrator's board. This can be tacked to thin strips of wood and held on a stand. I also have an easily portable ceiling for portrait work, a large umbrella coated on the inside with aluminum paint. The umbrella shape directs much of the light efficiently toward my

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BOUNCE IS ALWAYS READY, always right for baby photos. Their activity demands lighting that will be pleasing no matter where they turn or what they do. Unless you use bounce you can easily lose the best expression or beguiling look that you most want to catch.

SHADOWS from bounce light are soft-edged and soft-toned. Relieved from lighting worries, photographer can concentrate on fleeting expressions, catch momentary pose.

subject but lets enough of it spread around to fill up the shadows.

If you use flash you must get it off your camera and onto a stand which will bring it fairly close to the ceiling. A No. 5 peanut bulb should give you enough light and action-stopping ability. With fast pan film, try an exposure of 1/50 at f/11 when the ceiling is clean white and 8′ to 10′ high.

Just Set Light, Then Bang Away

If you use floodlamps, set up three or more together so that they will give the effect of a single lamp. When bounced, incandescent light is fairly weak. A small camera with a fast lens will be necessary if you want to catch children at play. For adults, setting your camera on a tripod and using exposures of a fifth or half a second will allow you to stop down for depth of field. With a white ceiling and three No. 2 photoflood lamps you might try 1/50 sec-

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ond at f/2 or ½ second at f/8 with fast film.

Placing your bounce light closer than 30″ from the ceiling may give you too small a light source and sharp shadows. The lower the light the softer the shadows, but make sure that no part of your subject is getting light from the bulb itself.

Don't place your light so close to your sitter that the bounce hits him from directly above. This tends to produce hollow, shadowed eyes and a long downward nose shadow. Try to get your light so it comes off the ceiling at a 45° angle.

Bounce light is so simple and dependable that some of the biggest commercial studios often premanently set up a bare strobe light high in a far corner of a completely white room. The model walks out to a marked spot on the floor and throws out her chest. The photographer just clicks the shutter and knows that his $2.50 sheet of color film is perfect. END

BOUNCE LIGHT COOPERATES and never gives blank, inky shadows. Boy under the blanket, shielded from all direct light, still is nicely illuminated by bounce light. Also pleasant: the absence of sharp, dark competing shadows on the background wall.

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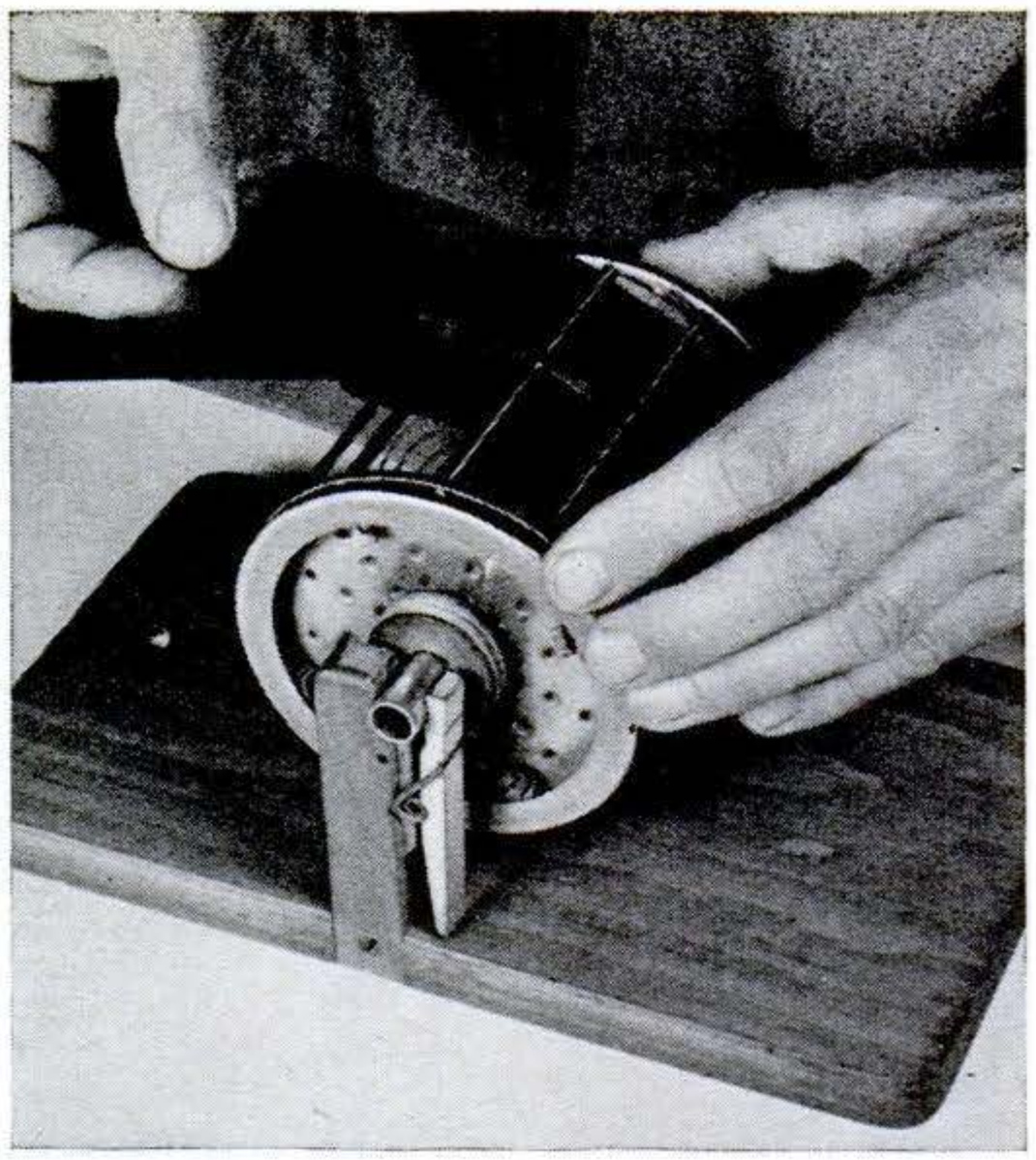
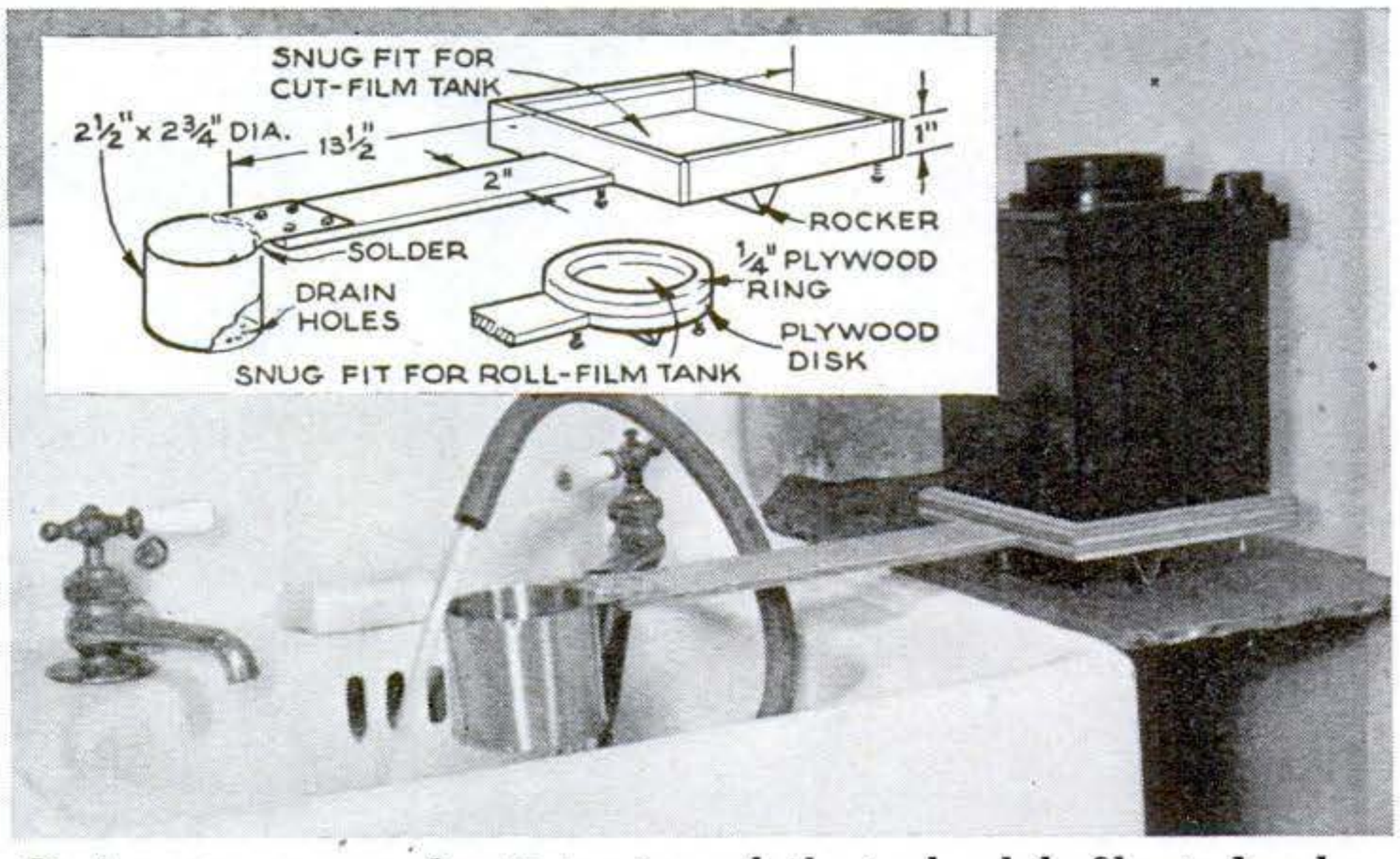
How to Make Better Pictures Faster

These darkroom tips will help you do a better job each time you have a developing and printing session.

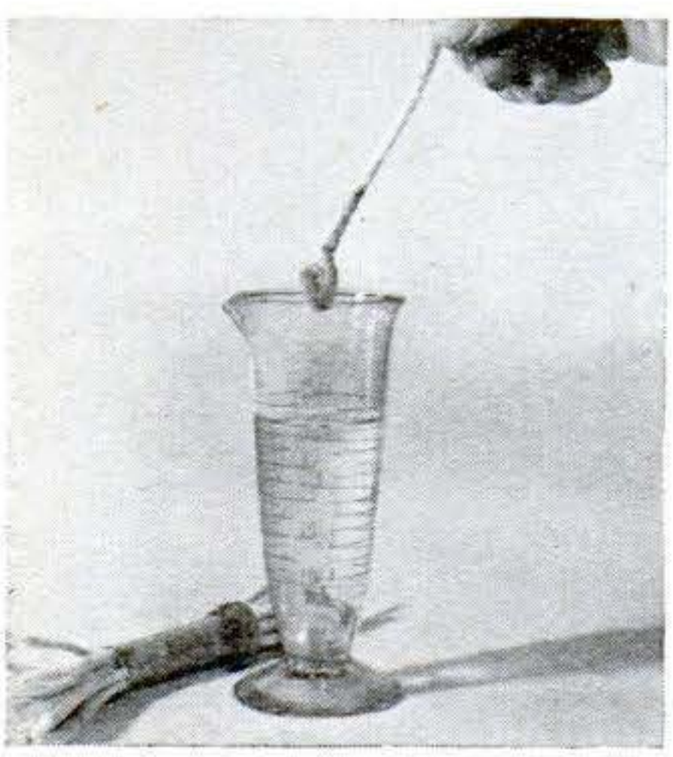


1 Loading film in a developing tank is easier when you clamp the reel on a stand like this. For this one, collars were turned from plywood to hold the reel on a ½" shaft. Half of a spring clothespin clamps the shaft to an upright mortised into each side of base.

2 Developer temperature can be seen at a glance when you pull the bottle from the shelf if you store a small photographic thermometer in it. You won't need to waste time checking whether the solution is too warm or cold.



3 A water-powered agitator to rock the tank while film is developing leaves you free for other darkroom jobs. This one will operate as fast as a stroke per second. Locate the rocker (V-shaped metal or half-round) so that the loaded film tank will just tip up the empty cup. Aim the stream to hit the outer rim of the cup at the top of its arc. Holes in the bottom let water drain out after the cup drops. Two projecting screws at the rear of the tank base and one at the front limit the distance the tank can rock.



4 Weak spots on prints can be brought up by daubing on full-strength developer with a pipe cleaner bent into a tight ball at one end. Use the same trick for applying reducer.

5 High-speed washing for rush prints can be done with a plumber's force cup. The print goes face down in a tray of water. Press lightly over successive parts of the back, forcing out the hypo. Then replace the water and repeat the process.

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$5 Fighter Delights Junior Pilots

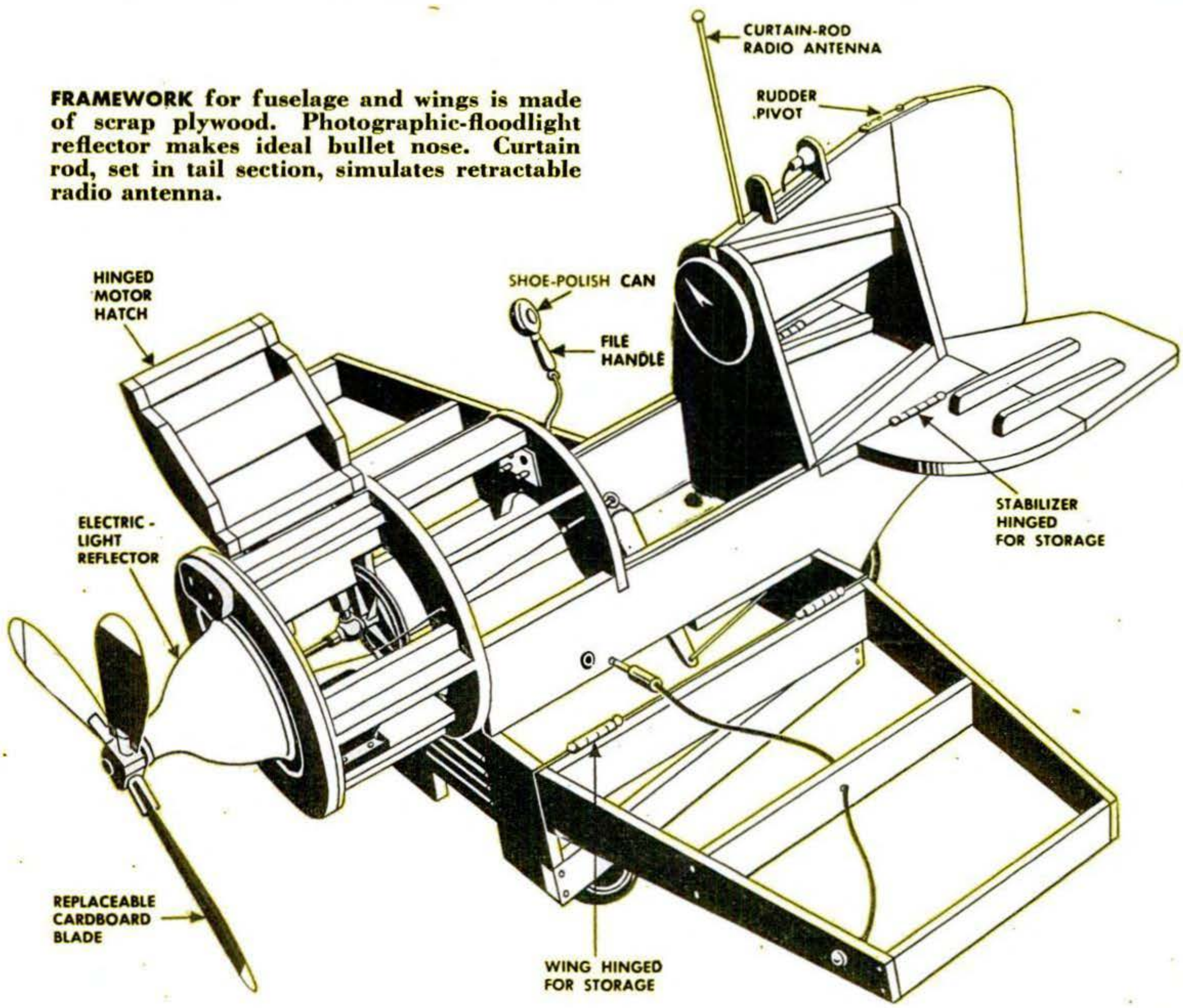
By Henry B. Comstock

Real controls and a prop that spins make this a hot plane for any young ace. You can build it with scrap.

AN OLD floodlight reflector turned our cellar into an aircraft plant last Christmas. The reflector looked like the bullet-nose of a fighter plane, and I knew a small boy with a yen for flying.

Starting with that steel stamping, the night shift swung into action on top-secret

FRAMEWORK for fuselage and wings is made of scrap plywood. Photographic-floodlight reflector makes ideal bullet nose. Curtain rod, set in tail section, simulates retractable radio antenna.



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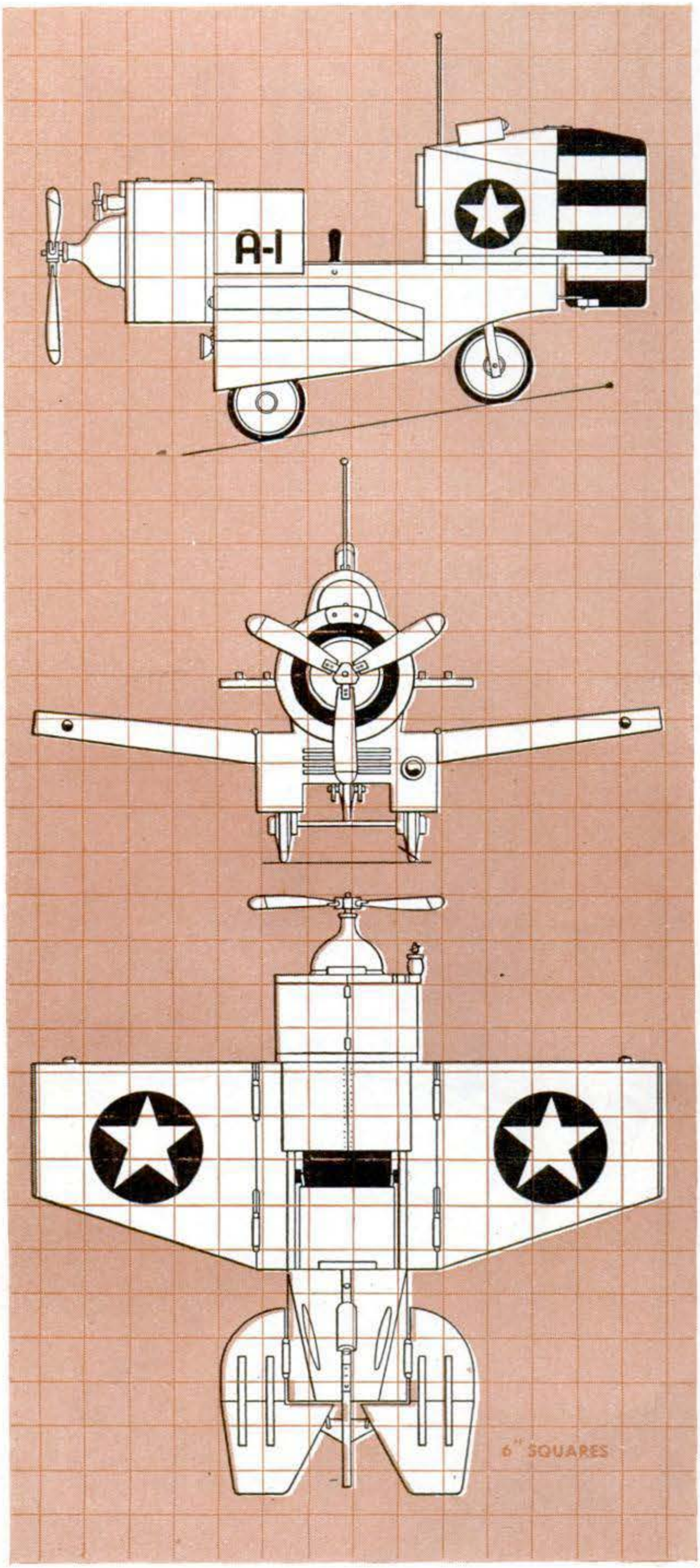
plans, and 28 work hours later Uncle Sam's newest fighter was ready for its Christmas-morning mission to Shangri-La. It has been flying ever since, and the only bug that has ever developed is its one-man cockpit—there are too many dogfights among the cub pilots clamoring to take over the controls.

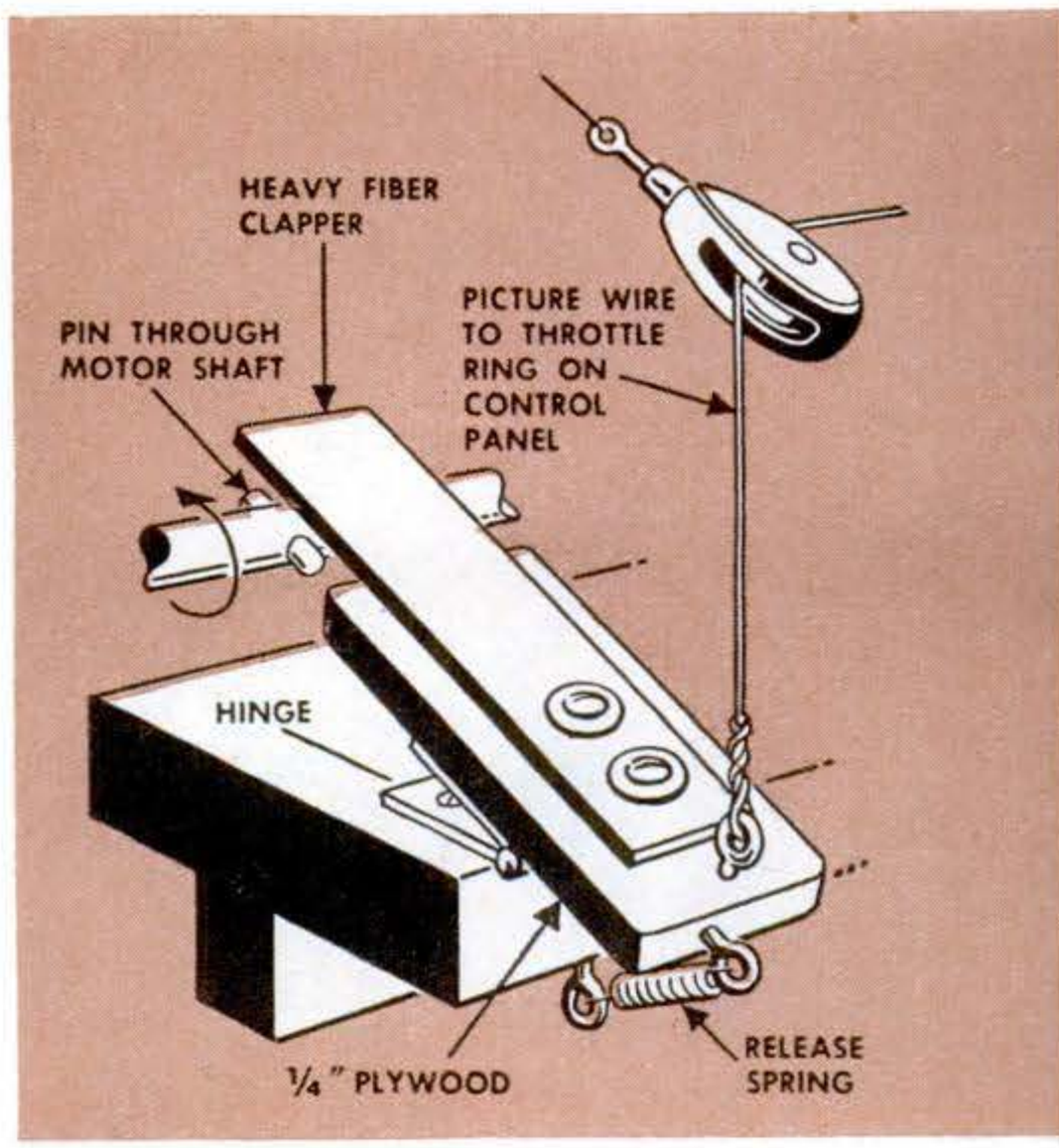


If you want to please some youngster with a similar model this Christmas, bear in mind that even major changes in design will in no way affect the plane's ability to stay on the ground.

The 7′-long plane that I built actually cost me less than $5 for new material—electrical equipment and paint. Everything else, like the reflector, came from the scrap box or the used-lumber bin.

Plywood ¾″ thick, salvaged from discarded kitchen cabinets, frames the fuselage and wings; old sheets of illustration board make a durable covering for all curved surfaces; and sheets of ¼″ plywood prevent small shoes from breaking through the wings. These wings, incidentally, are hinged for carrier-based operations—and convenient storage in the playroom.

The little ship is powered by an old sewing-machine motor, with a belt connection to the propeller shaft. The combination of cardboard blades and a slack belt makes it entirely safe if a young grease monkey steps in the path of the oncoming plane. The only damage in that case is to the propel-



FULL-THROTTLE ROAR is produced by fiber clapper. When throttle is pulled back, clapper is loudly vibrated by pin in motor shaft. Motor is small sewing-machine type fed by extension cord from house or garage outlet.

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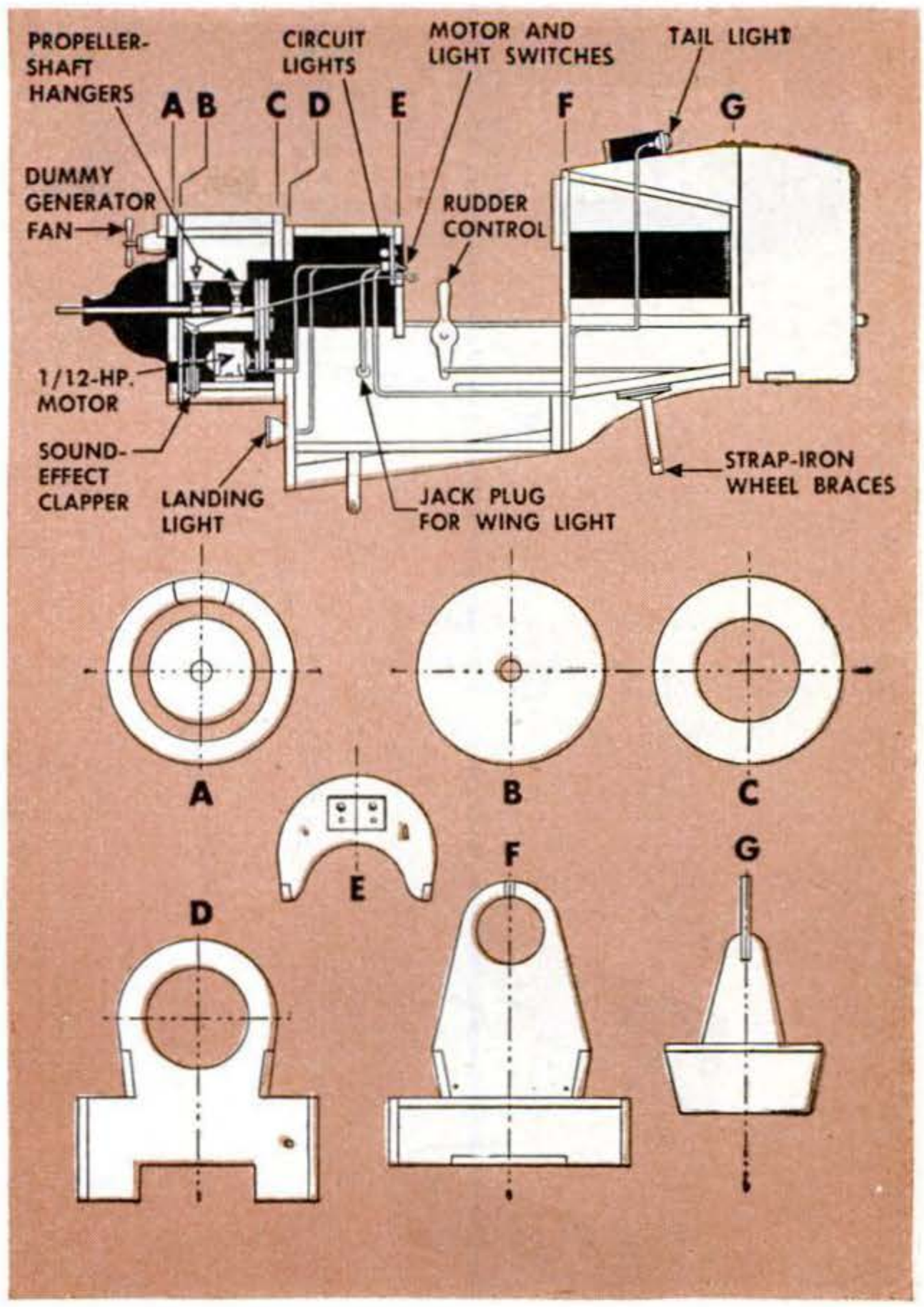
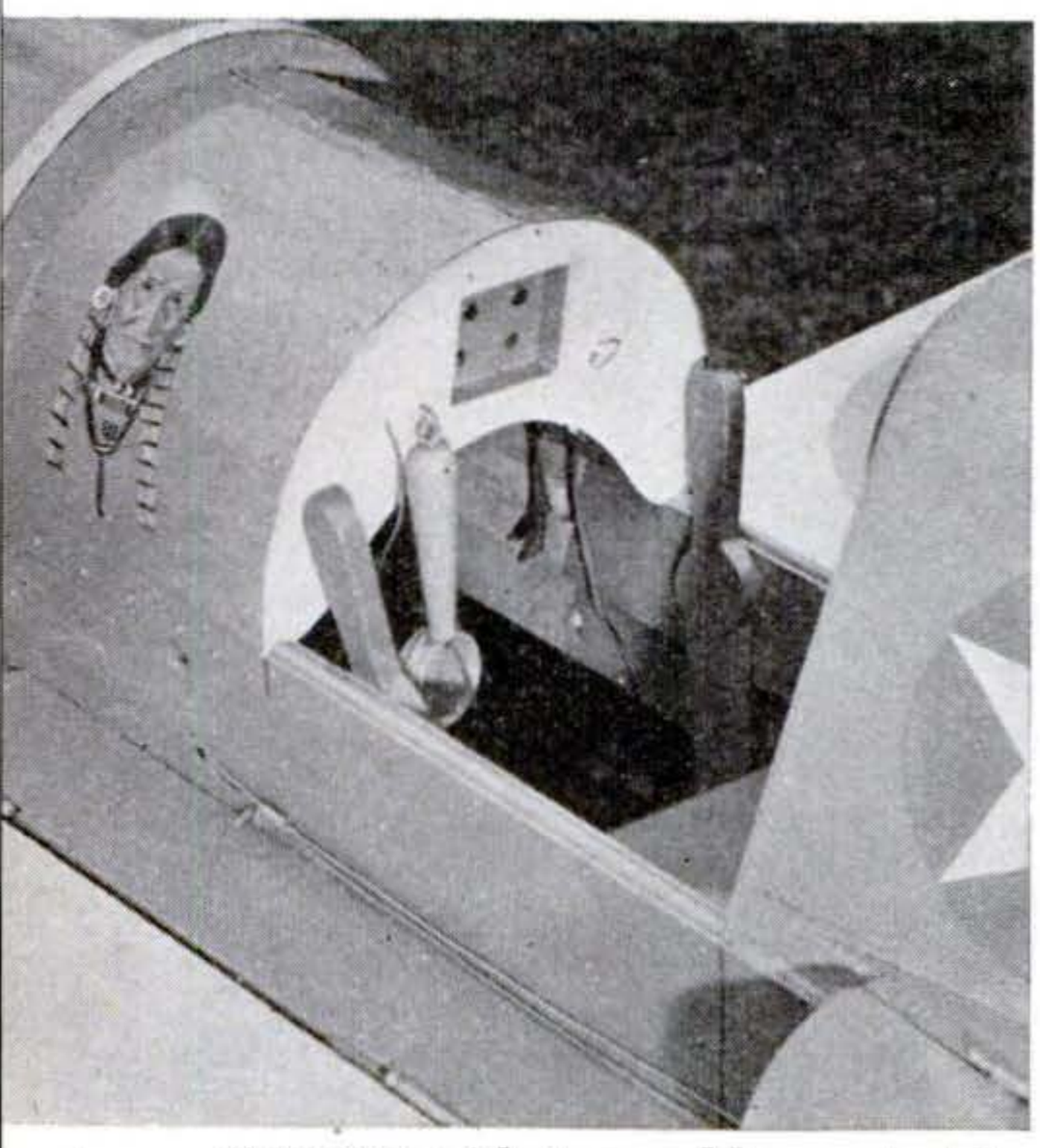
ler, whose blades can be quickly replaced by loosening and resetting six screws in the slotted hub section. Engine sound is produced by a fiber clapper in contact with a nub on the motor shaft. When the plane is "idling," a spring holds the clapper away from the shaft; to "rev up," the pilot draws back on a chokelike handle set in the control panel.

The other cockpit fittings include toggle switches controlling the motor and light circuits, with a Christmas-tree lamp blinker flashing the wing and tail lights on and off when flights are in commercial airlanes.

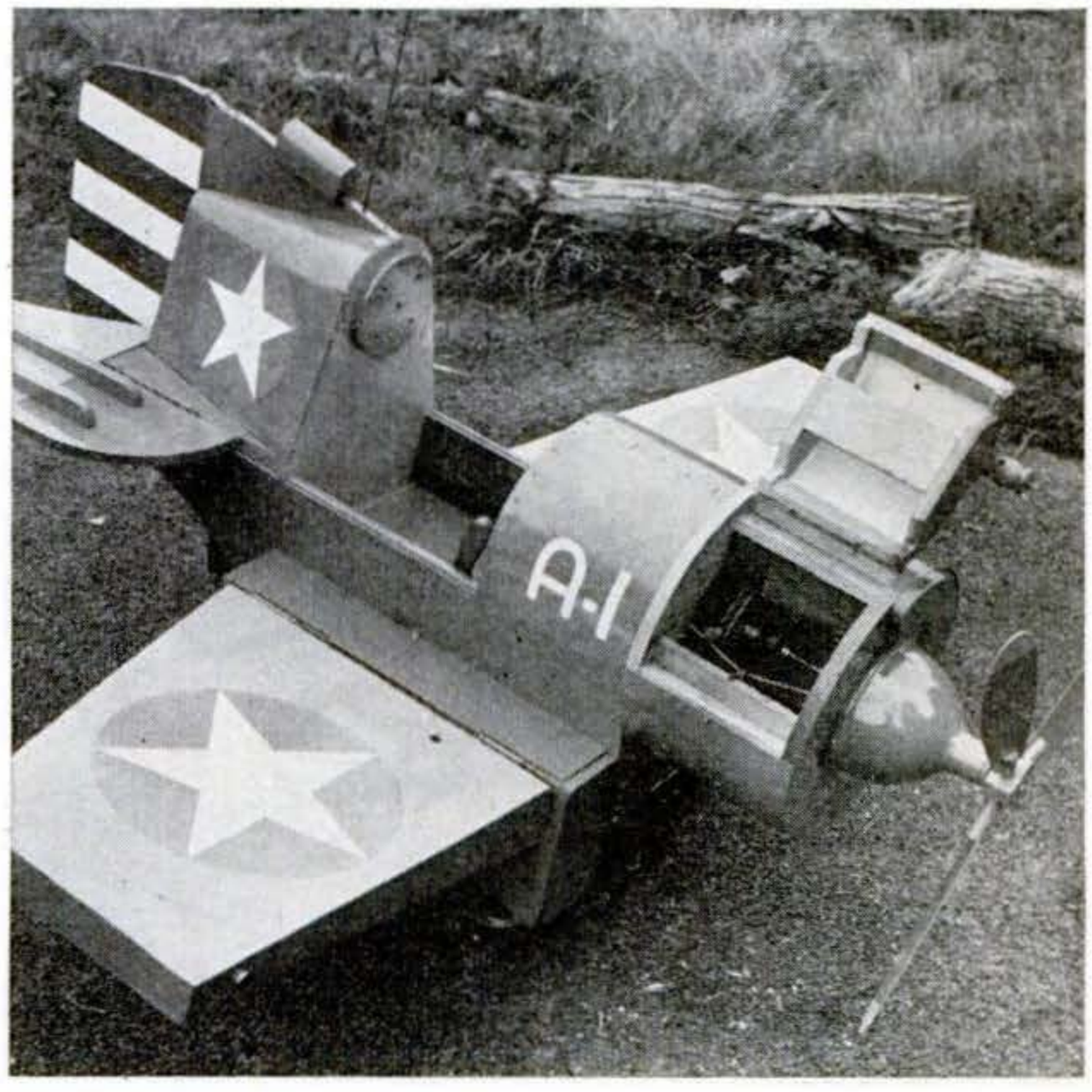
Joy-stick operation of the rudder has been discarded in favor of two levers attached to the sides of the fuselage, and directional control on the ground calls for some footwork on the top surfaces of the landing wheels. To maintain contact with control towers, there is a hand microphone—a shoe-polish can attached to an old file handle. A short length of light clothesline runs from the handle to an imaginary radio. END





COCKPIT, with two rudder-control levers, light switches and a pull-back throttle that actuates the sound clapper, keeps the hands of the fledgling pilot busy putting plane through its make-believe paces.

HINGED COWL HATCHES open on either side to let junior mechanics "check" engine. Rounded fuselage is formed by covering frame with illustration board. Wings and horizontal stabilizers fold for easy storage.



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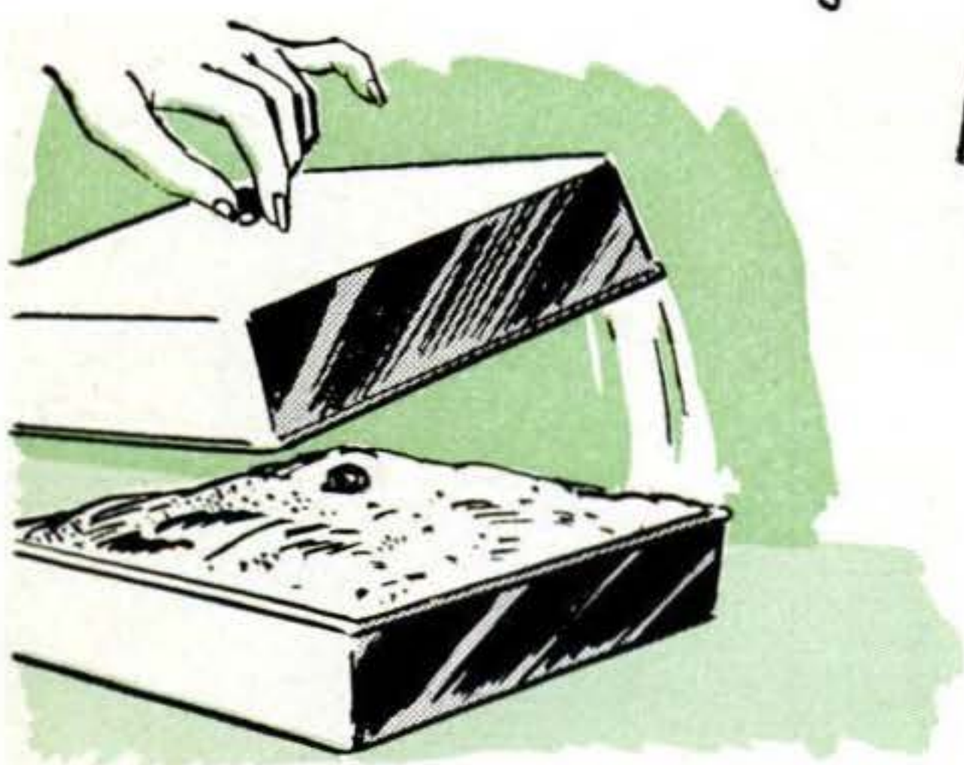
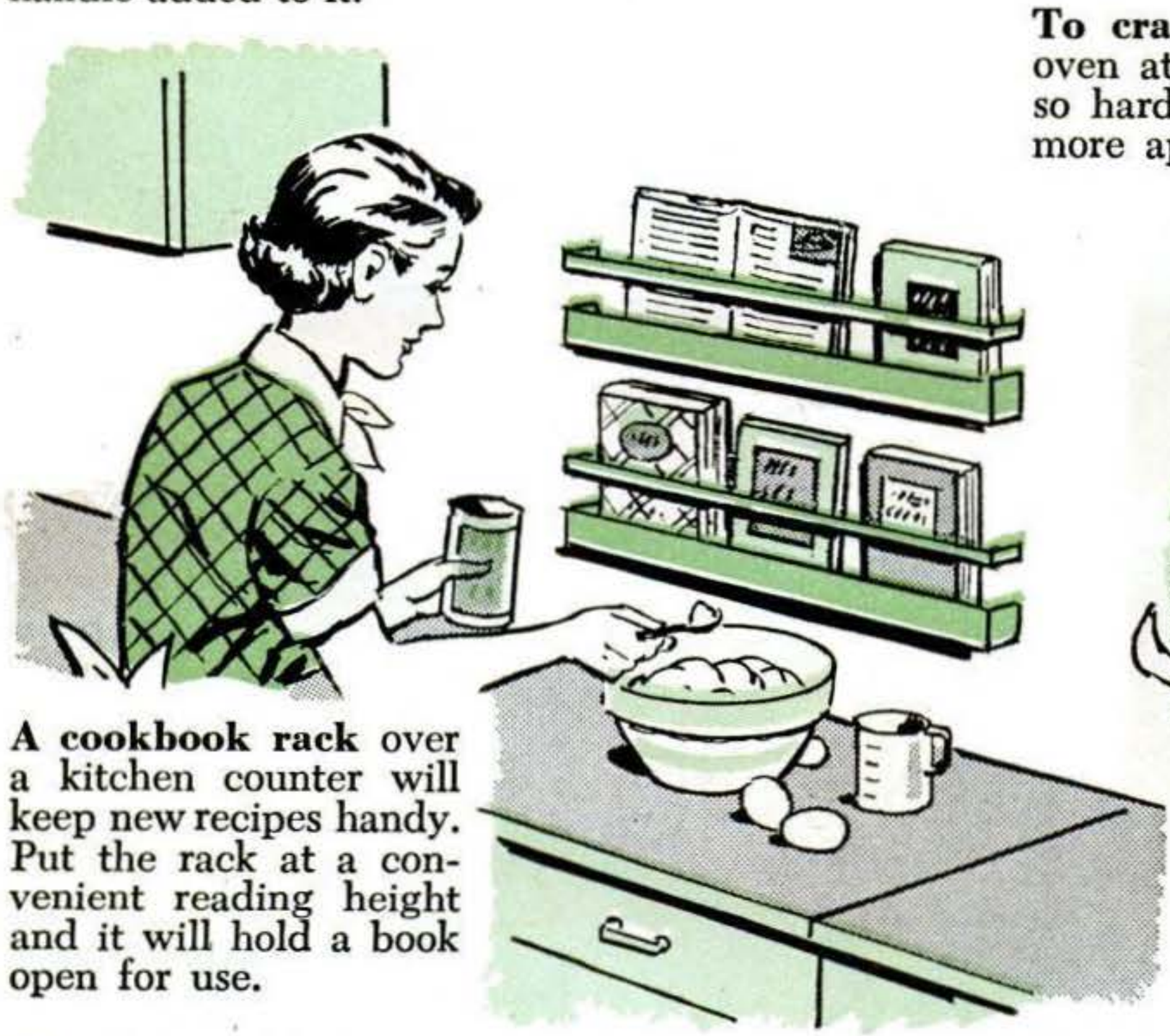
Keeping the Home Shipshape

Need a paperhanger's table? A strip of plywood 28" wide laid over the ironing board works fine. And no extra space is needed to store the table between jobs.



A square cake that won't fit a round cake box can be kept fresh if stored in the baking pan. For a lid, use a larger baking tin of the same shape, with a handle added to it.

To crack Brazil nuts, warm them in the oven at low heat. You won't have to crack so hard to break the shell and the meat is more apt to come out in one piece.



A cookbook rack over a kitchen counter will keep new recipes handy. Put the rack at a convenient reading height and it will hold a book open for use.

Try an eyebrow tweezer for beautifying the Thanksgiving bird. It will lift out tiny pinfeathers quickly and neatly.

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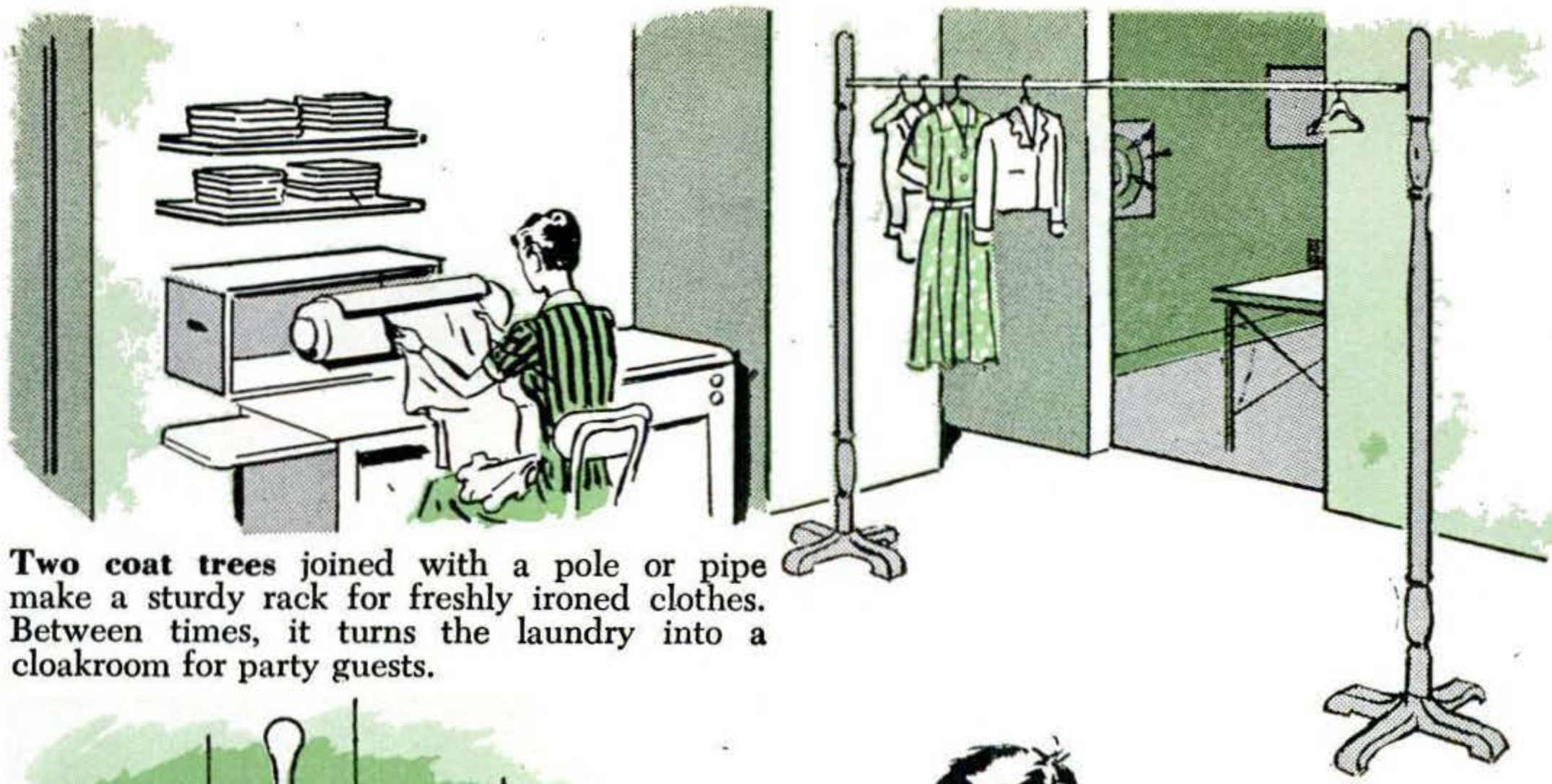
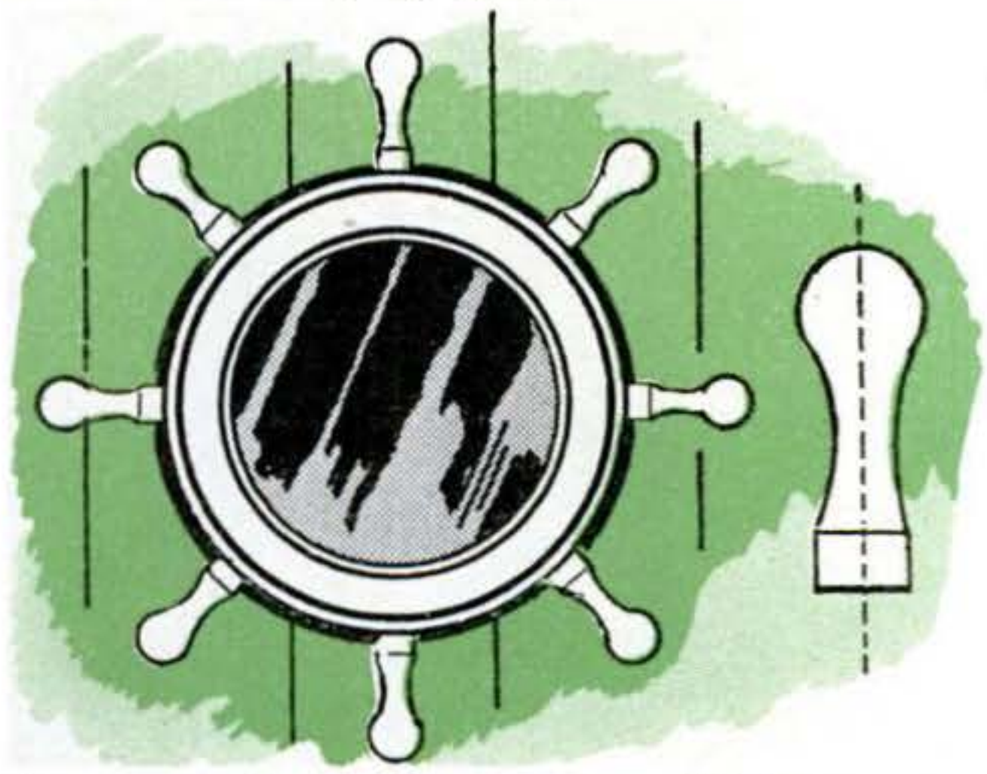
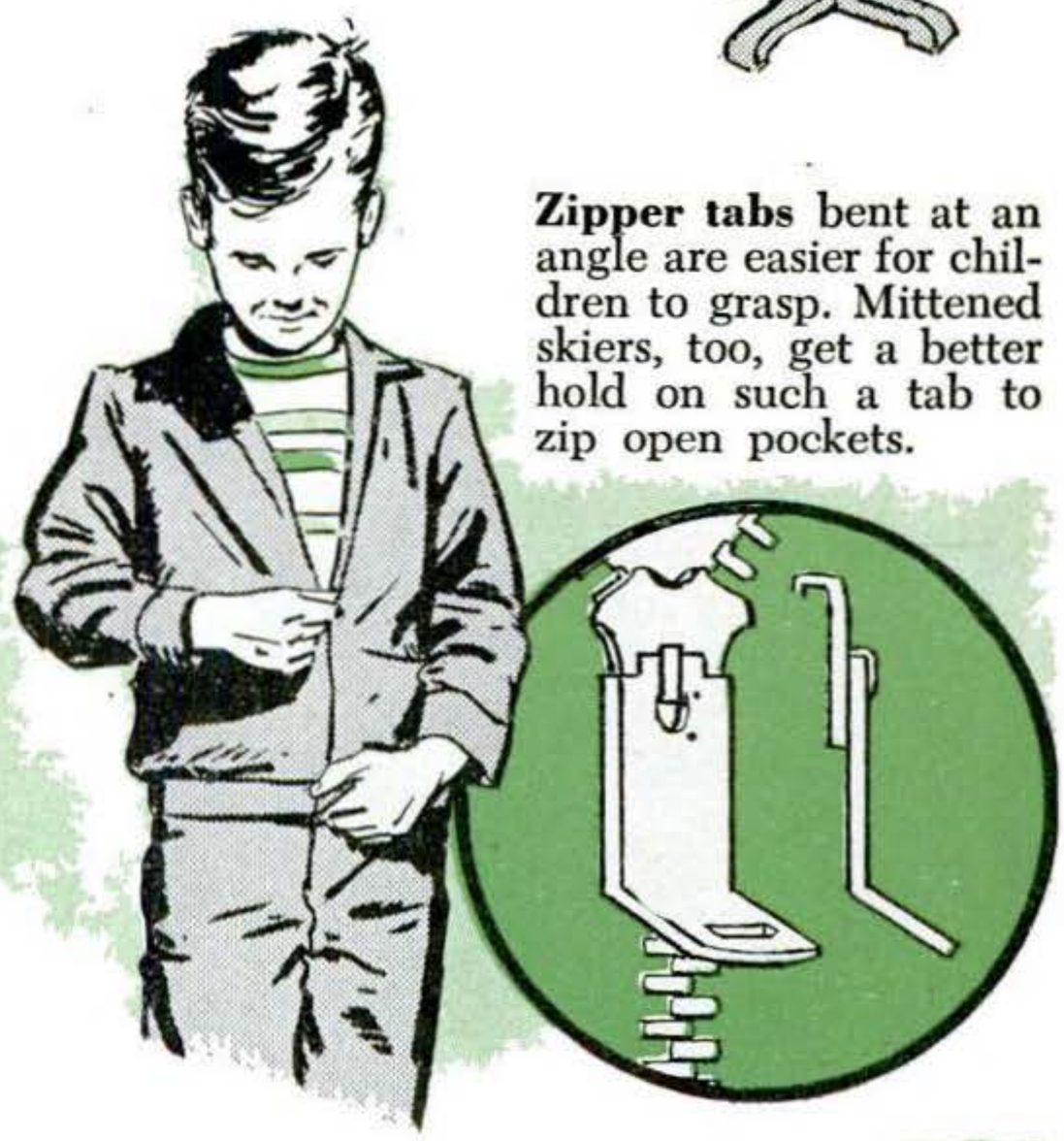


Two coat trees joined with a pole or pipe make a sturdy rack for freshly ironed clothes. Between times, it turns the laundry into a cloakroom for party guests.

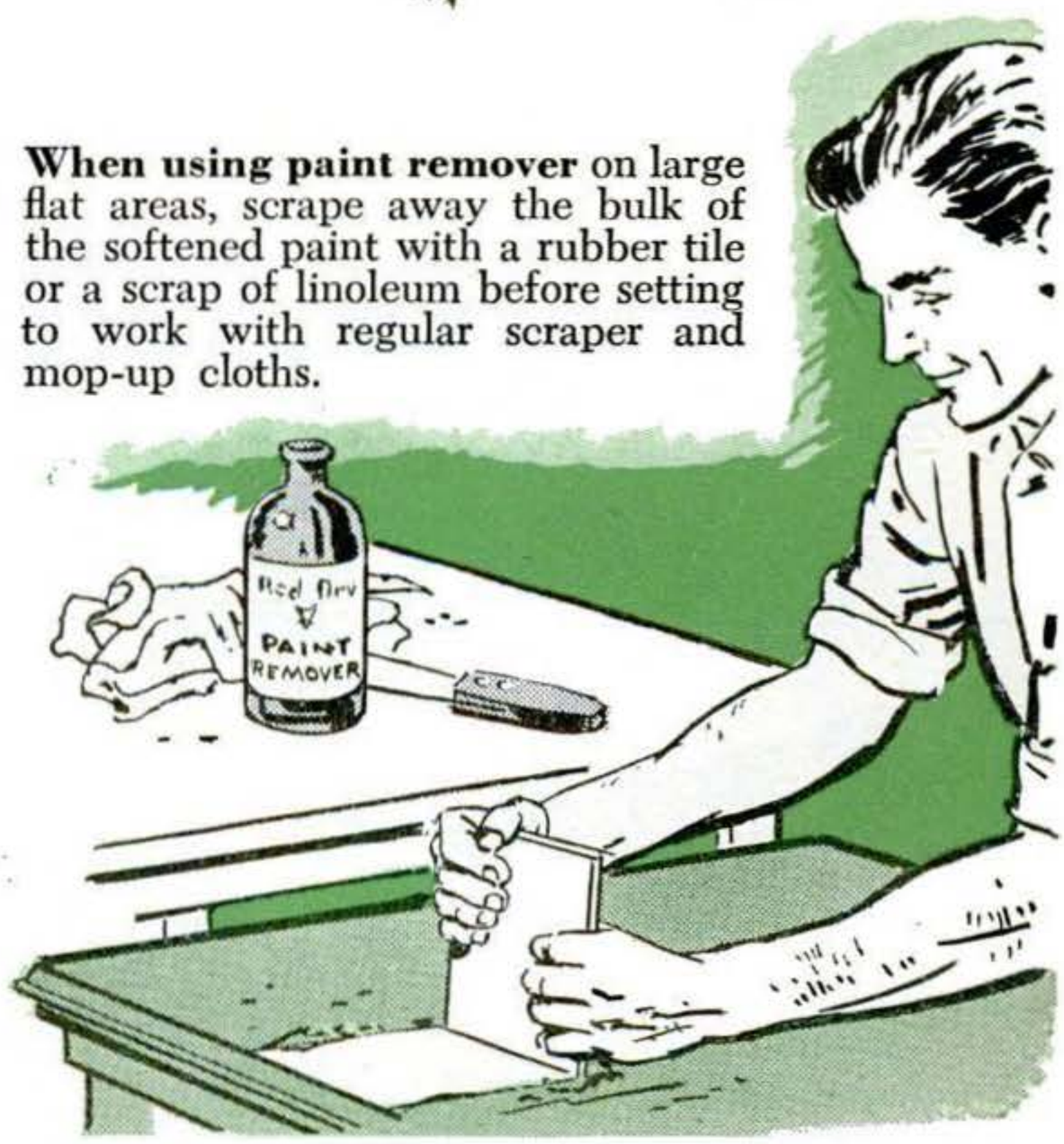


A nautical touch can be added to a round mirror with file handles cut in half. Drive a brad part way into the end of each half handle, snip off the head, then press it into the frame.



Zipper tabs bent at an angle are easier for children to grasp. Mittened skiers, too, get a better hold on such a tab to zip open pockets.

You don't have to squat and grope for items at the back of the bottom pantry shelf. A box on noncastering flush-mounted wheels will roll right out into the open with its cargo.



When using paint remover on large flat areas, scrape away the bulk of the softened paint with a rubber tile or a scrap of linoleum before setting to work with regular scraper and mop-up cloths.

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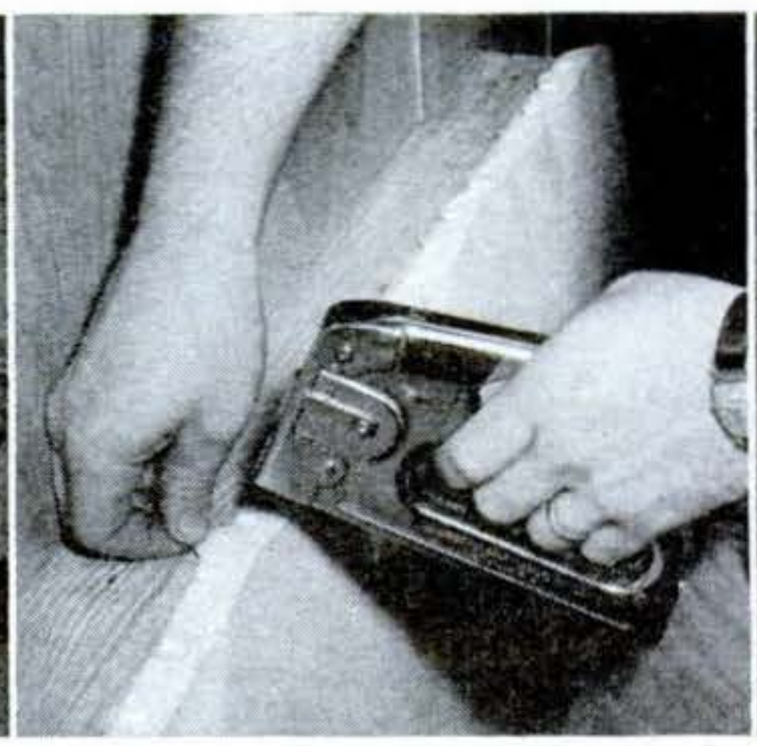
FRAMEWORK of benches was covered with Novoply. Seat frames were built as lift-off units so space below could be used for storage.



FOAM RUBBER 1″ thick pads the seats and backs. Staples go through edge of rubber only; stapling through entire thickness leaves dimples.

UPHOLSTERER'S COTTON was stapled over rubber to provide additional padding and round off corners. Avoid leaving lumps in the cotton.

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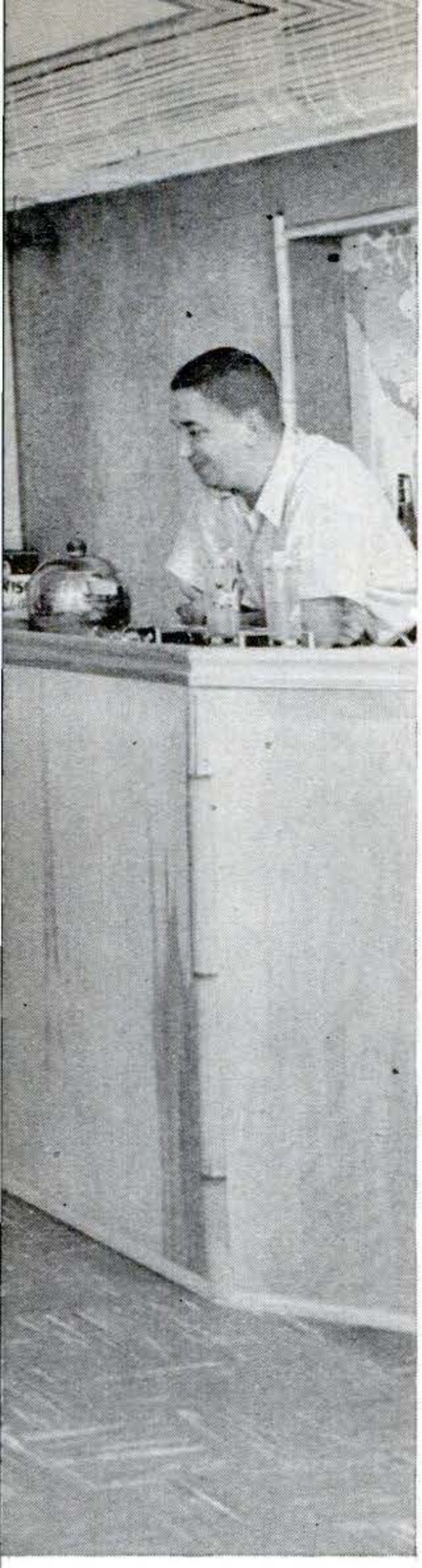


Finishing Off Your Remodeled Basement

Bamboo trim and simple built-ins not only hide pipes and beams but turn your basement into a real room.

By Bernard Gladstone

NOW that our basement is finished, we wonder how we ever got along without it. So many of our activities—working to entertaining guests—are centered there now.

The work area includes a darkroom, shop and a laundry. Also in this room is a big storage closet for clothes. Across the hall from the work area is a combination utility-storage room. The playroom has a bar at one end, built-in benches and a children's toy closet.

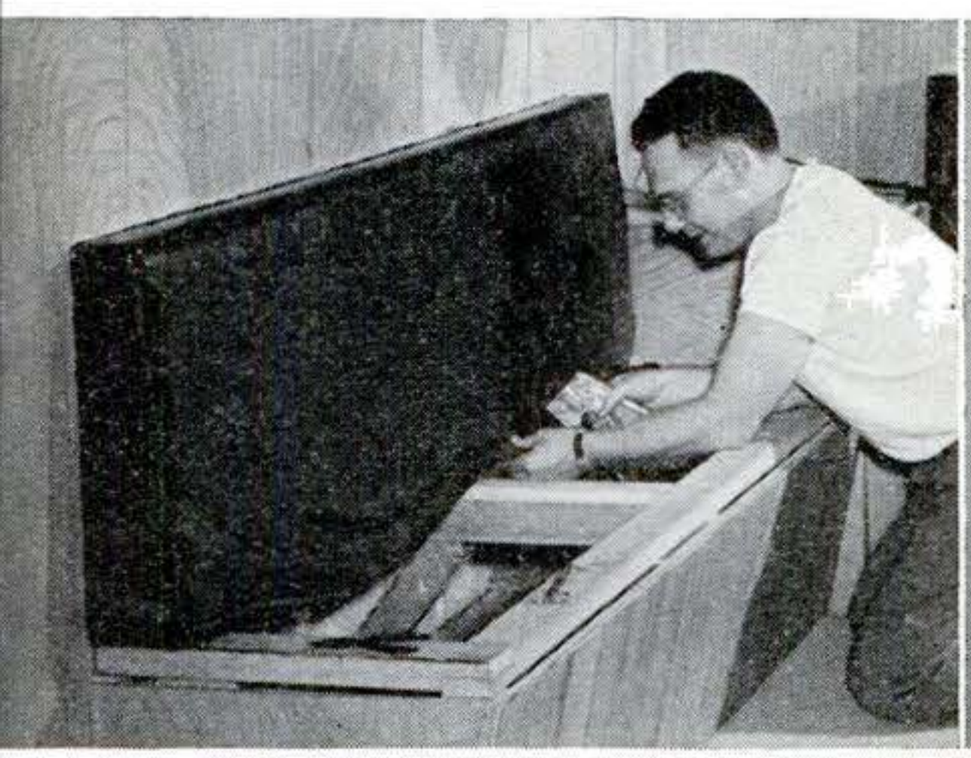
Studding, walls and ceiling were detailed last month in POPULAR SCIENCE MONTHLY. Putting on the finishing touches took more time since the carpentry called for careful mitering and fitting.

The children's toy closet is a real break. It gets most of their toys out of their rooms and neatly out of the way when they are not playing with them. The doors to this closet were built on a framework of one-by-fours reinforced at the corners with metal angles. The inside of the doors was covered with Novoply[1] and the outside with Plankweld[1] to match the playroom walls.

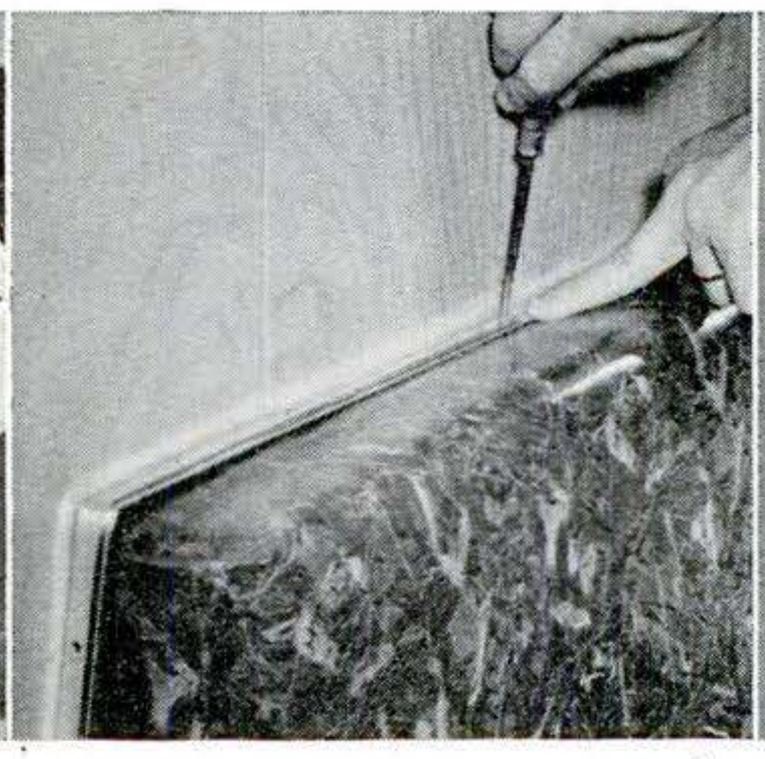
Bamboo blinds are a quick and inexpensive way to cover exposed pipes. It's a lot simpler than boxing the pipes in and also leaves them readily accessible.

I bought inexpensive blinds and cut them into 12″ to 15″ lengths,

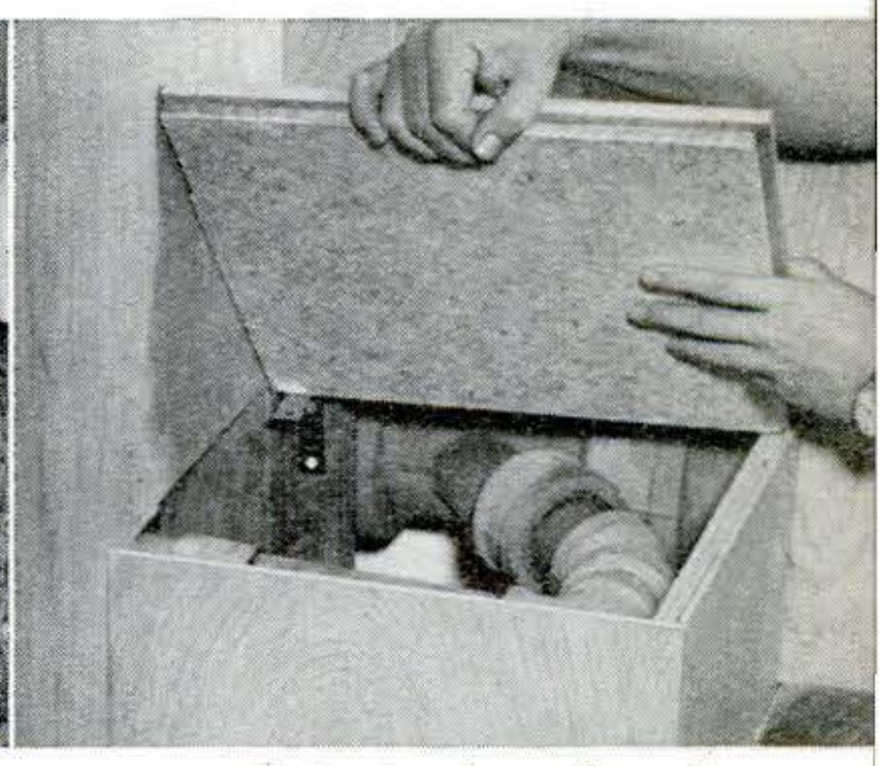
1. United States Plywood Corp., 55 W. 44th St., NYC.



PLASTIC FABRIC was stapled over cotton. Fold under about 1″ so staples drive through two thicknesses. Fasten bottom last.



CHROME MOLDING was used to cover exposed staples along top and sides. Staples along bottom of back are covered by the seat.



CORNER TABLES where bench seats meet have removable tops so that the pipes they conceal can be reached if necessary.

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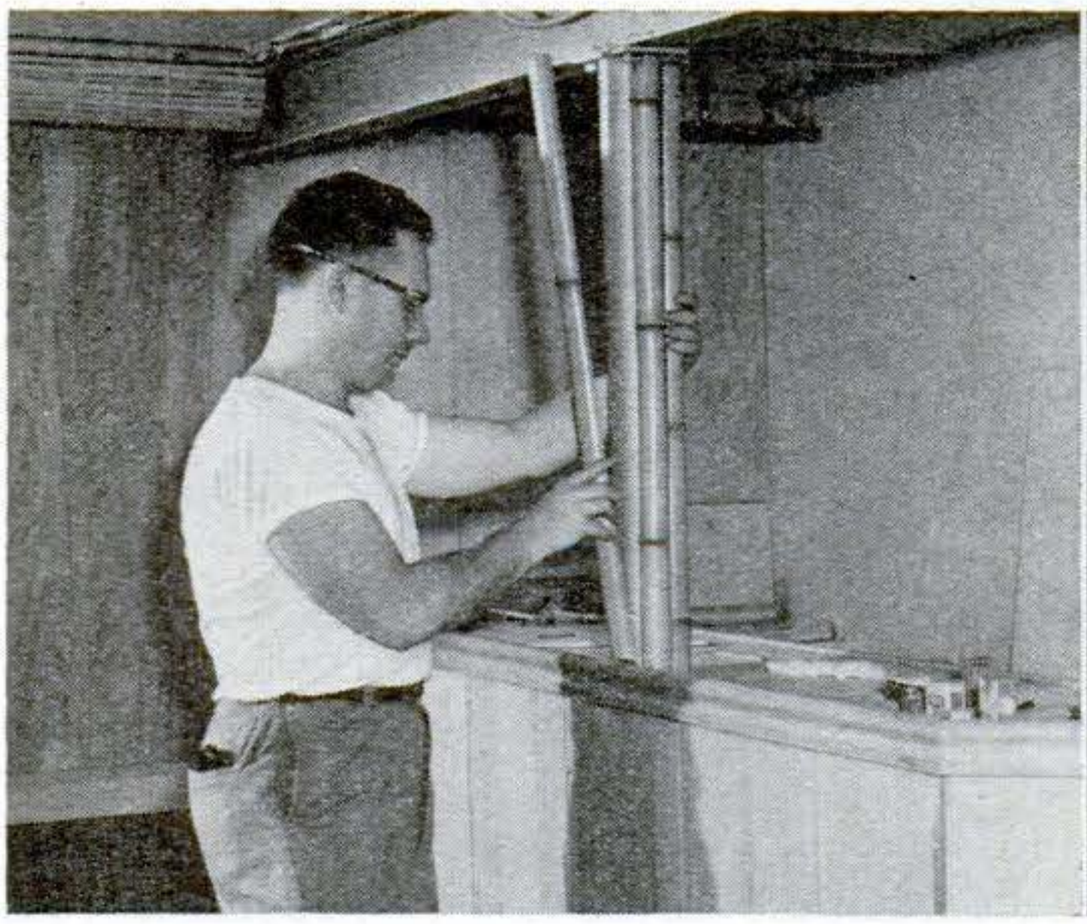
depending on how far down from the ceiling the pipes hung. Bamboo poles were tied to the blinds and hung on hooks screwed into the ceiling on each side of the pipes. Steel beams were concealed in the same way.

Our basement floor, like most others, is concrete. Also like a lot of others, it's not absolutely level. It has a few small waves in it which you don't notice unless you look closely. For that reason, I used asphalt tile on the floor. It molds itself to slight irregularities. It's also easy to lay, and you can walk on it as soon as you've put it down. I picked Kentile.[2]

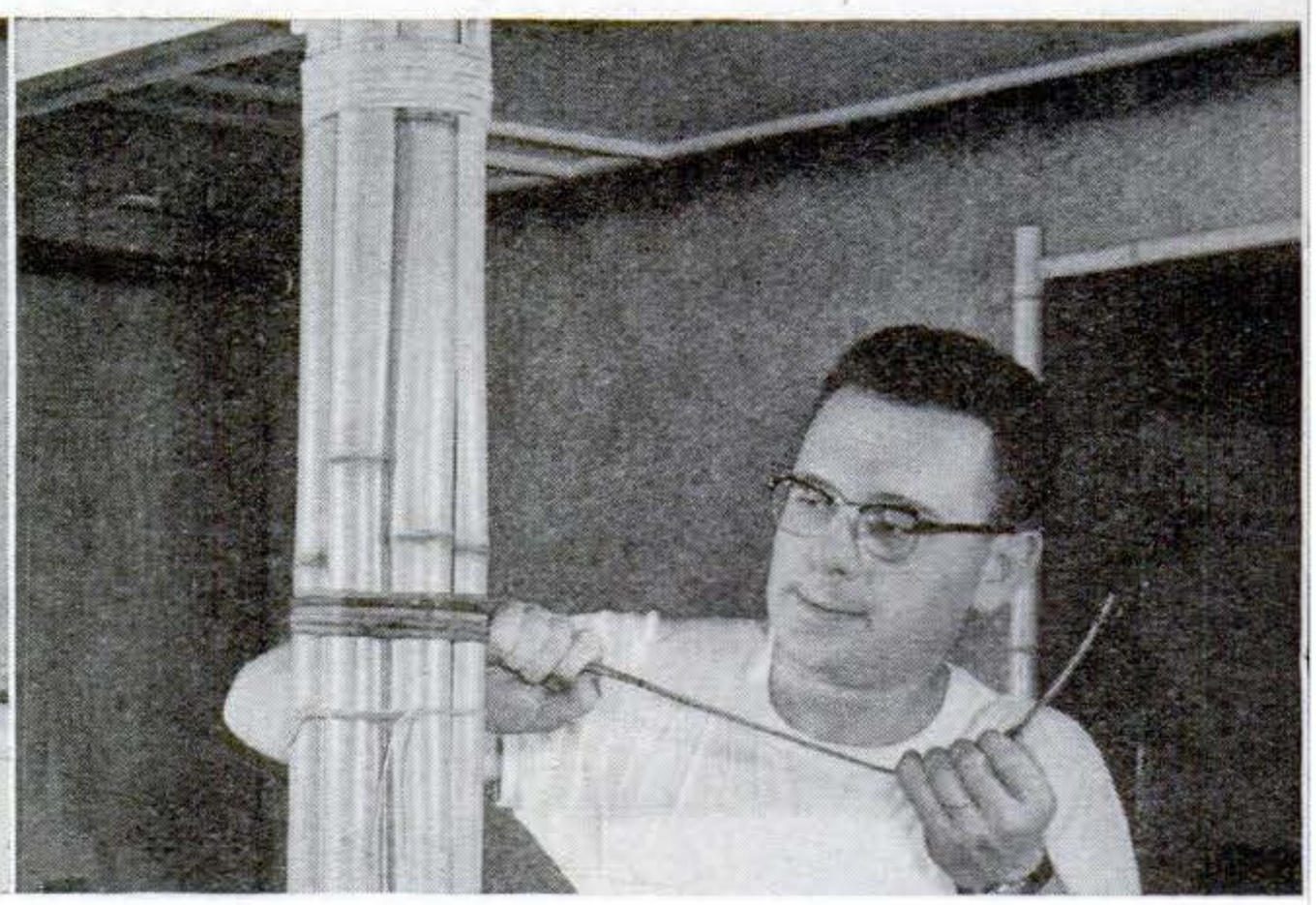
You can start to lay asphalt tile in either of two spots: from the center of the room or from the longest wall.

2. *Kentile, Inc., 350 Fifth Ave., NYC.*

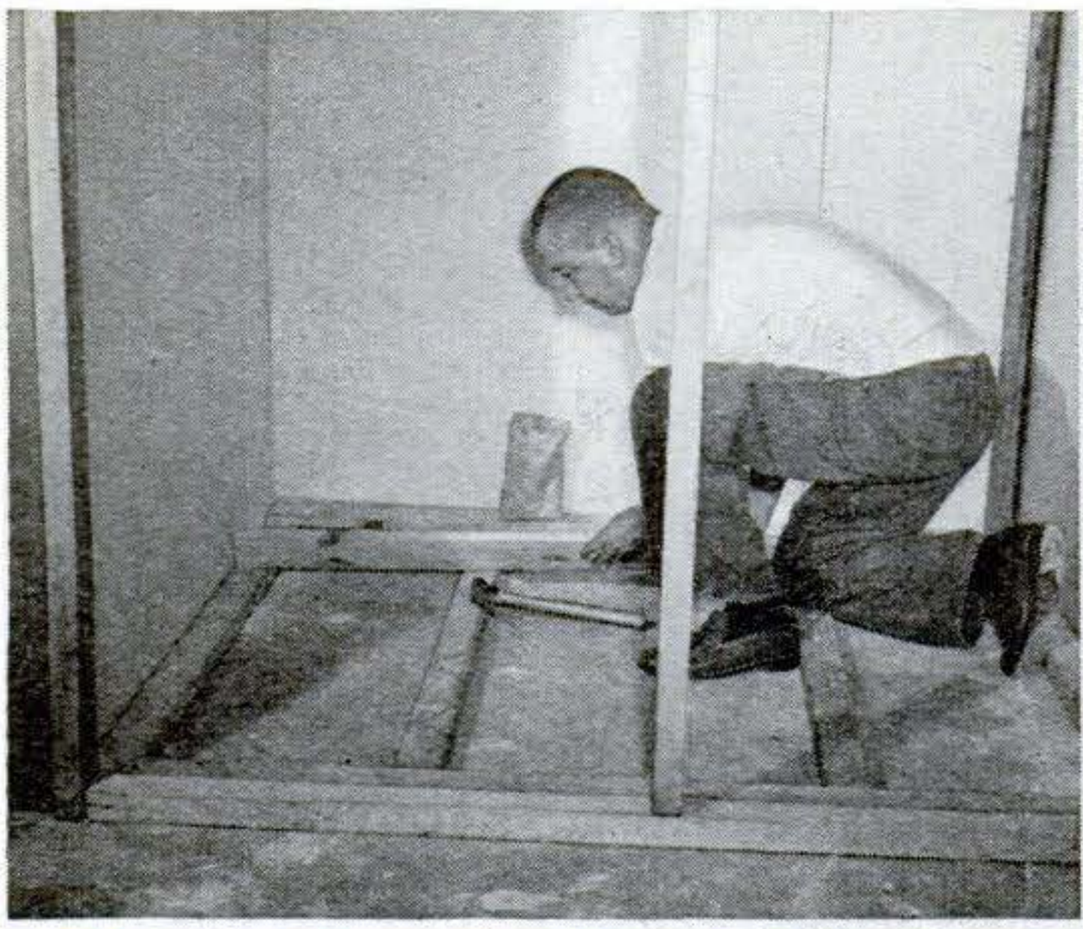
WASTE STRIPS from wall panels were cut to fit around windows, covering studs at each side and framing at top and bottom.



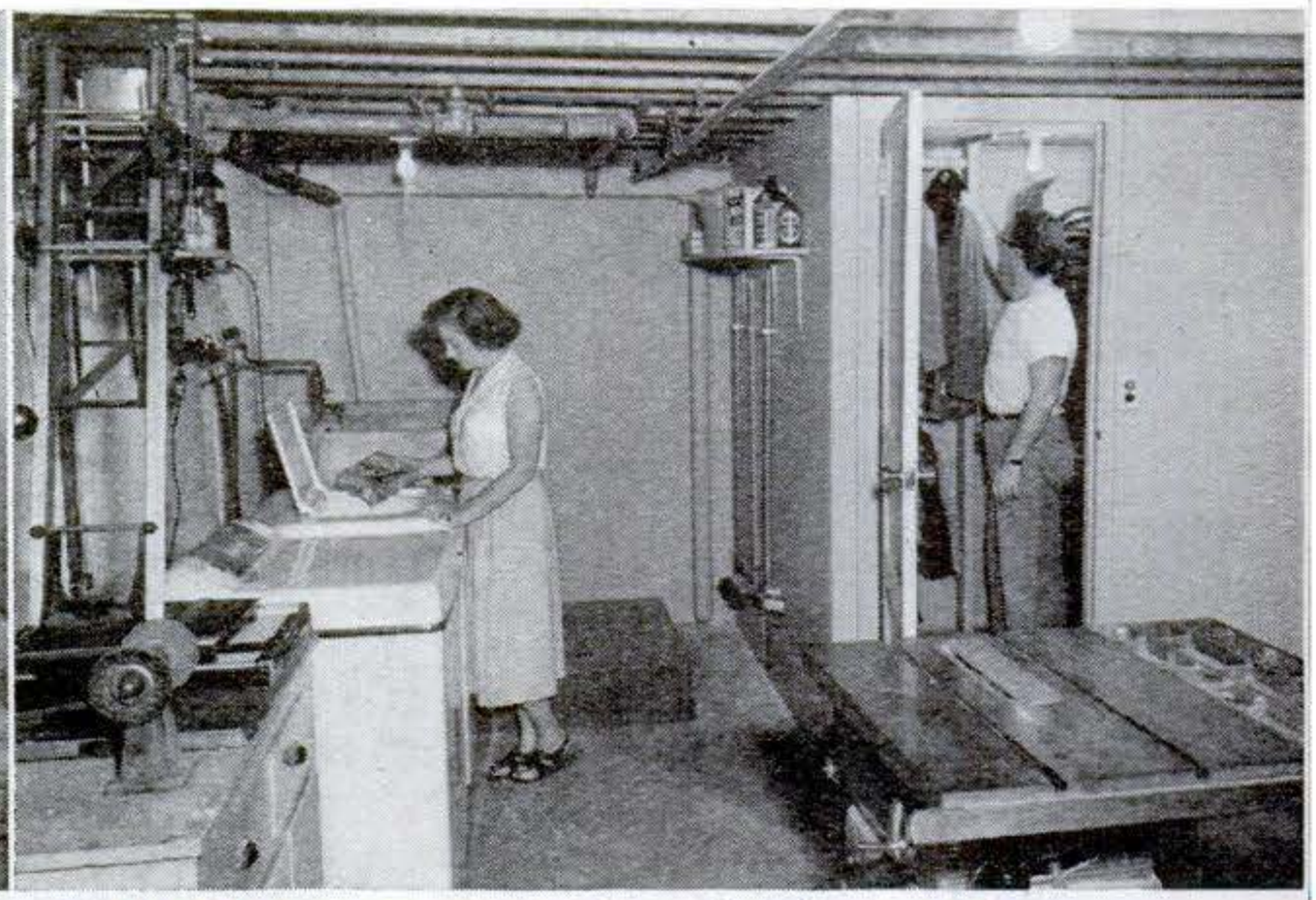
COLUMNS also were covered with half-round bamboo. Strips were ripped from bamboo poles about 2″ in diameter.



RATTAN, soaked in water to make it pliable, was wrapped around bamboo. Ends were tacked to bamboo and then varnished.



FLOOR of storage closet was raised off concrete by two-by-three joists and covered with linoleum. Walls are plasterboard.



STORAGE CLOSET, next to laundry, is coated on interior with cedar paint to discourage moths. Indicator bulb shows if closet light is on.

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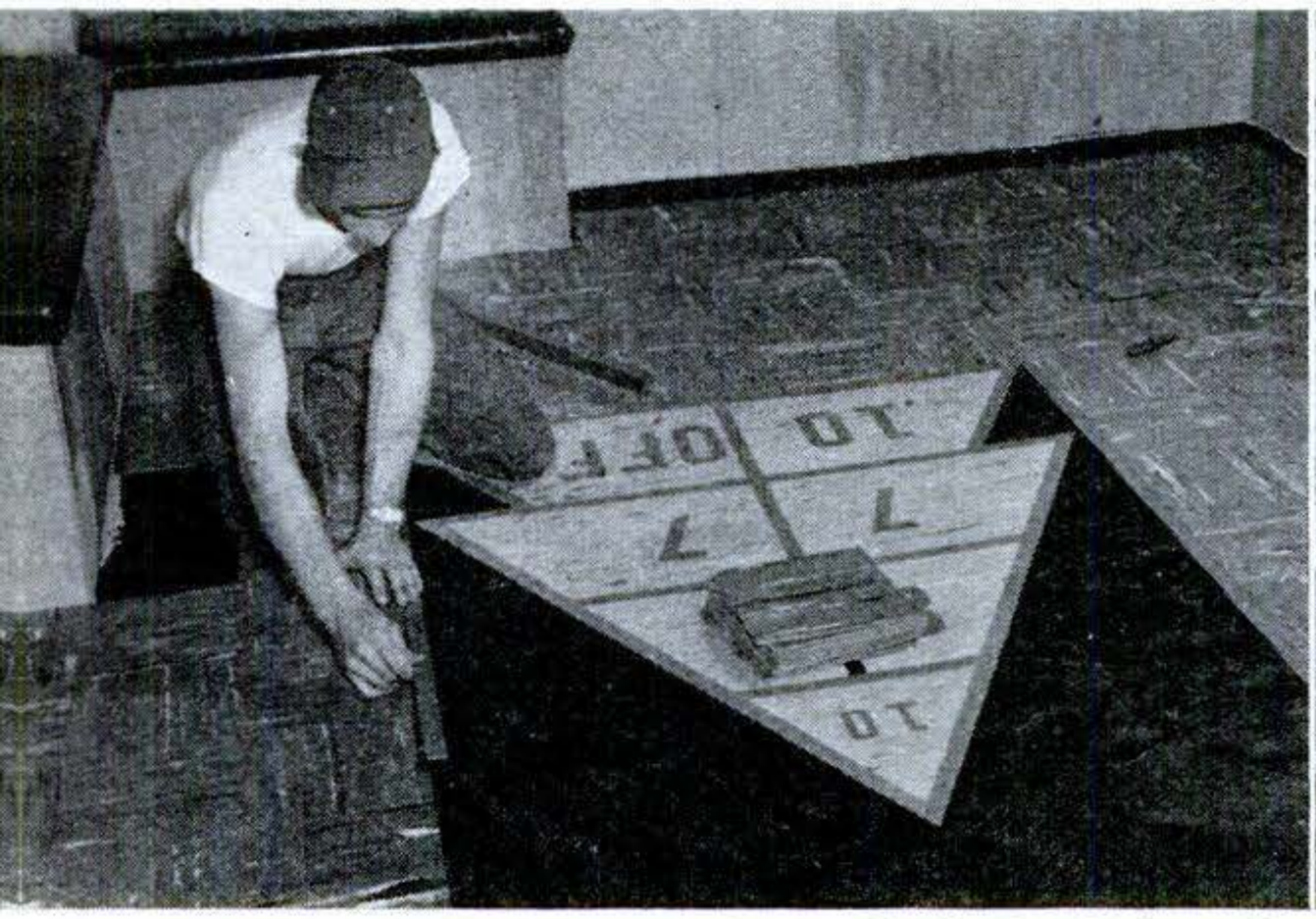
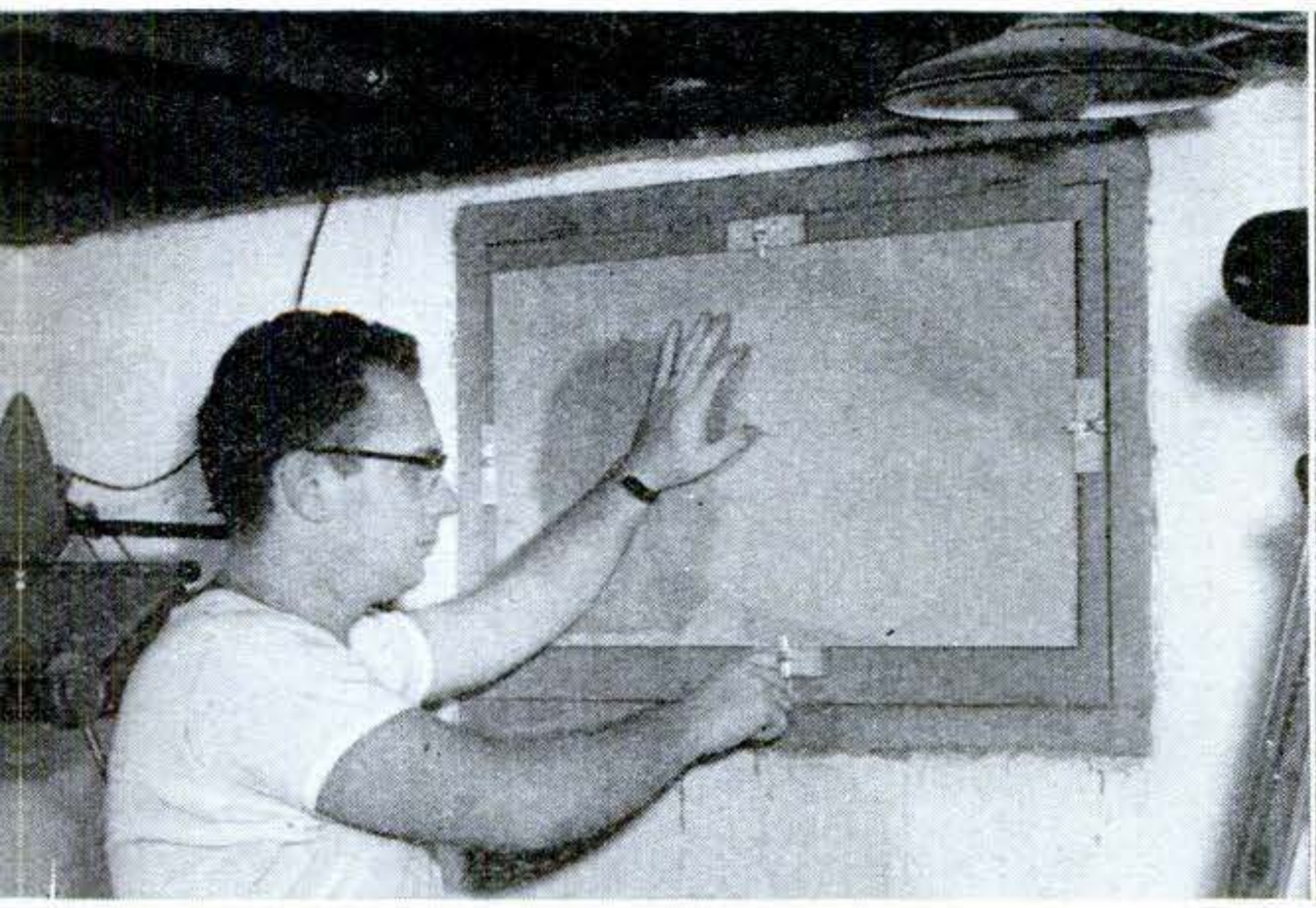
WINDOWS were finished with half-round bamboo. Bamboo was drilled and fastened to wall with fourpenny finishing nails.

BAMBOO BLINDS were cut into short lengths and used to hide pipes and beams. Blinds were only hooked to ceiling.



ASPHALT-TILE FLOOR has inlaid shuffleboard court. Shuffleboard tiles come precut, and background tiles are simply trimmed to fit.

QUARTER-ROUND MOLDING was used as trim around base and top of walls. Molding was stained and varnished before being nailed.



SHOP WINDOWS are fitted with removable covers to convert area into darkroom. Turn buttons hold plywood covers to the sash.

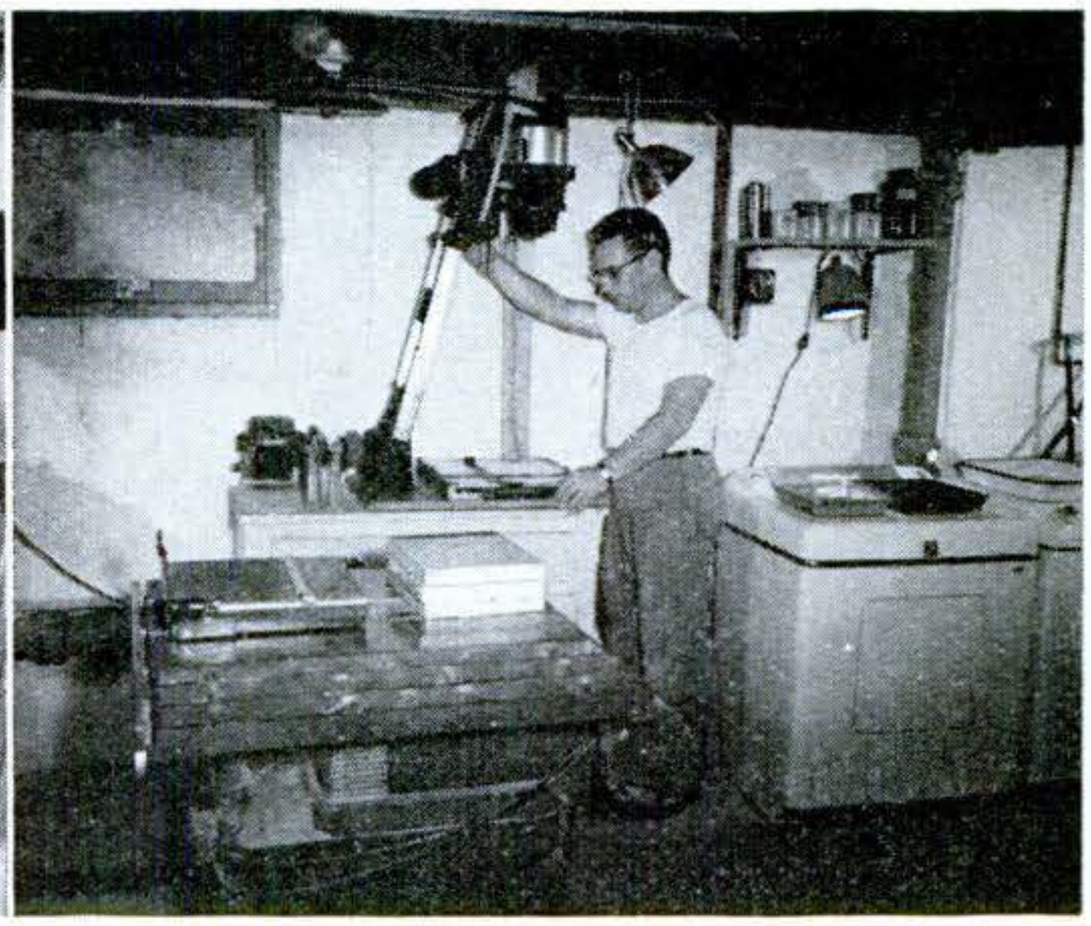


PHOTO EQUIPMENT is set up right next to laundry equipment so that trays for developing are handy to running water.

Please turn the page for more basement photos.

Copyrighted material

TOY CLOSET has blackboard and drop-leaf desk on inside of each door. Closet is 5′ wide and 30″ deep. Table-leaf supports hold desks up. Tile floor extends to back of the closet.

FUSE BOX is covered by door that has dart board mounted on it. Door is trimmed with bamboo and swings on concealed hinges.

SHOP is included in large room with laundry so that long lumber can be handled on power tools. Stock is moved in through window.

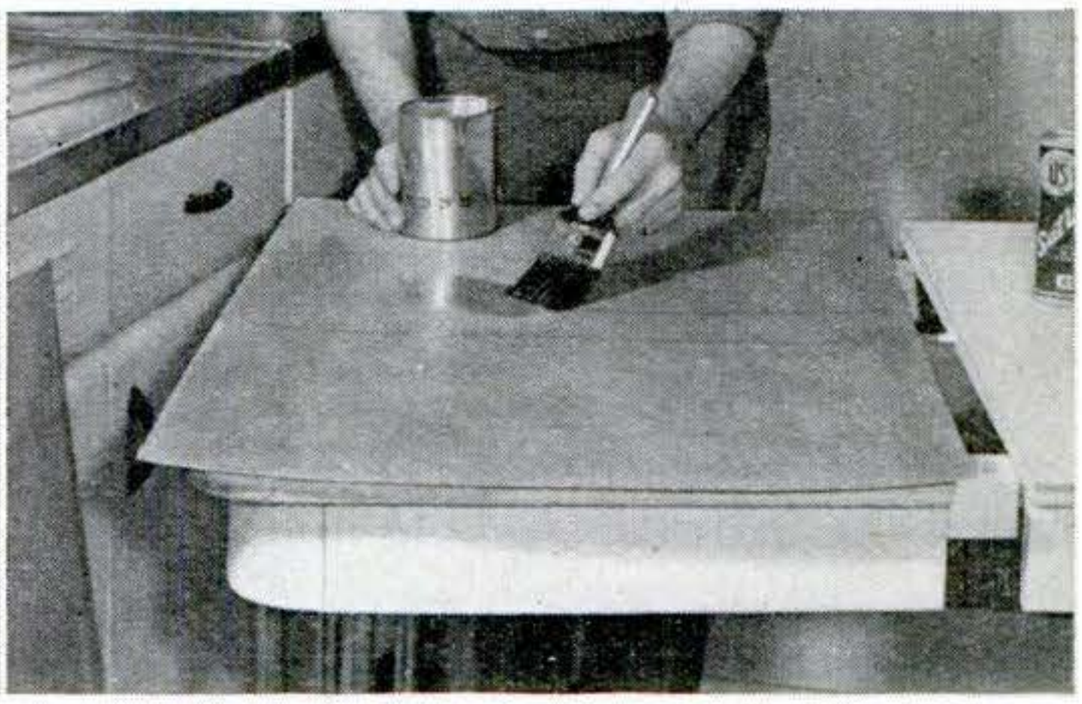
Plastic Table Topping Is Precoated with Cement

Hard, pliable surface sheet can be applied at home.

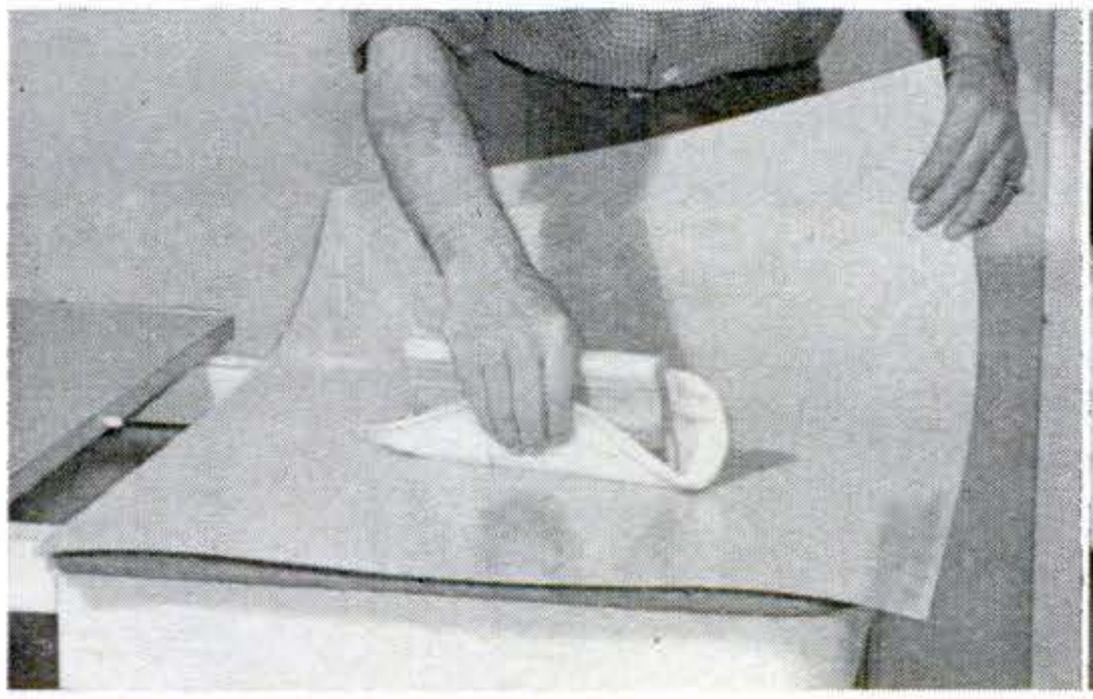
BRUSH activator on the back of this plastic surfacing material and it's ready to be smoothed on a table top or drainboard. The back of the material comes with the adhesive already on it, needing only the activator to change it into a tacky surface.

Once it is cemented in place, Satusply (made by the United States Rubber Co., Mishawaka, Ind.) forms a tough topping that resists boiling water, cigarette burns, alcohol and fruit acids. It comes in many colors and patterns in sheets as long as 8′.

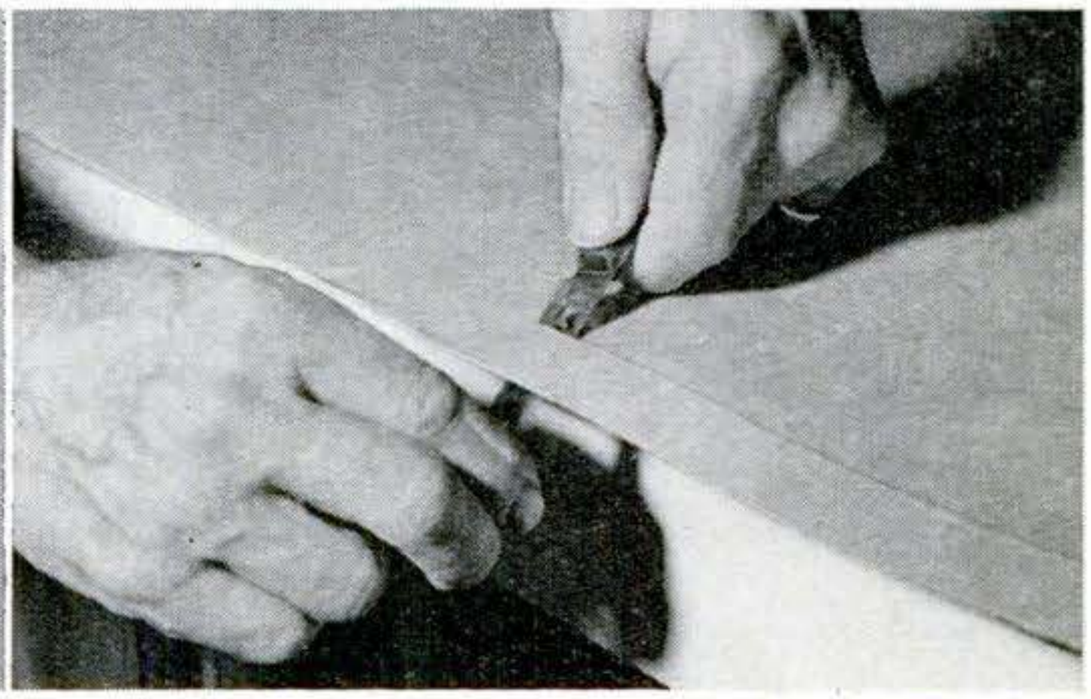
SURFACE TO BE COVERED is coated with activator and allowed to dry. Surface should be smooth, flat, dry and free of grease and wax.



ACTIVATOR IS NEXT APPLIED to back of Satusply, which is allowed to stand until tacky. It can be cut by scoring and breaking.

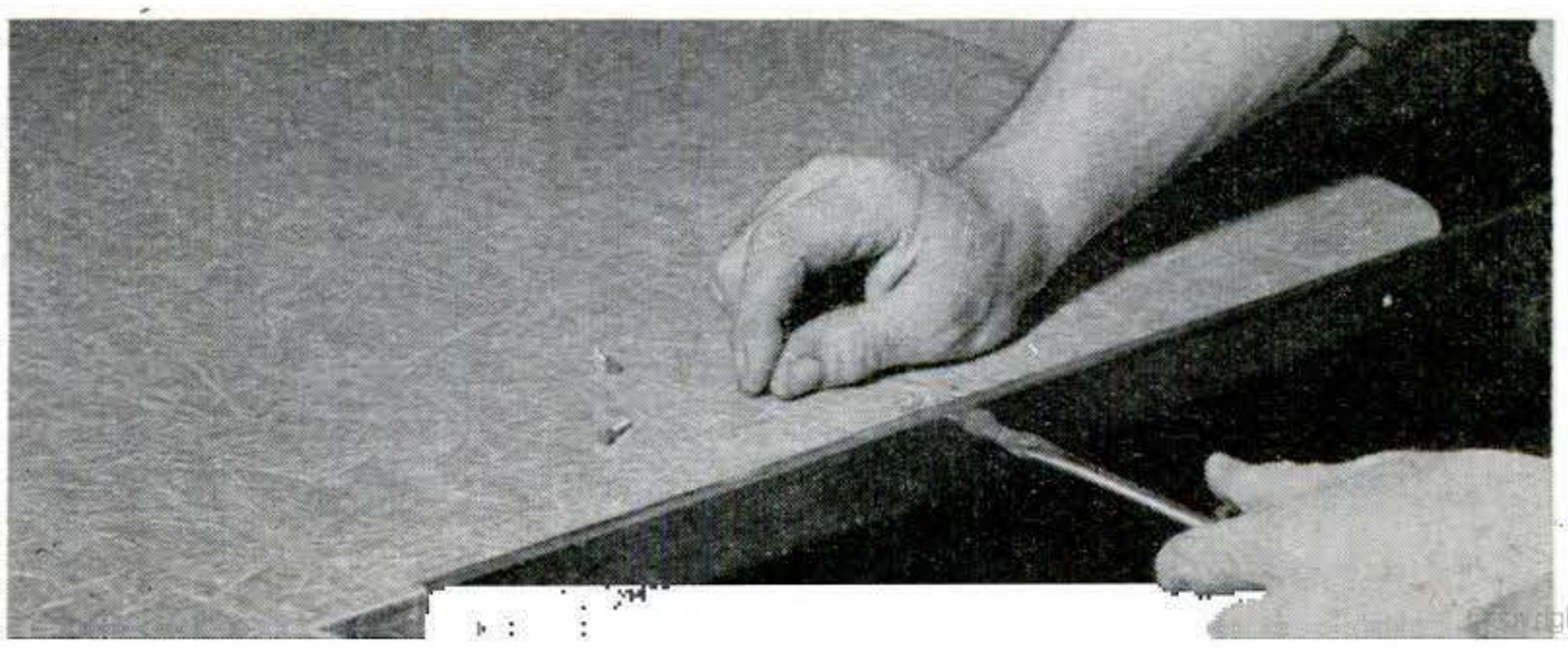


TACKY BACK IS GRADUALLY PRESSED on surface to be covered, then smoothed with a board covered with soft cloth.



TRIM EDGES with sharp knife held at 45° after material has been applied. About 1″ of Satusply should be allowed for trimming.

METAL MOLDING finishes table top. If edges of material are not even after trimming with knife, use sandpaper block to smooth.



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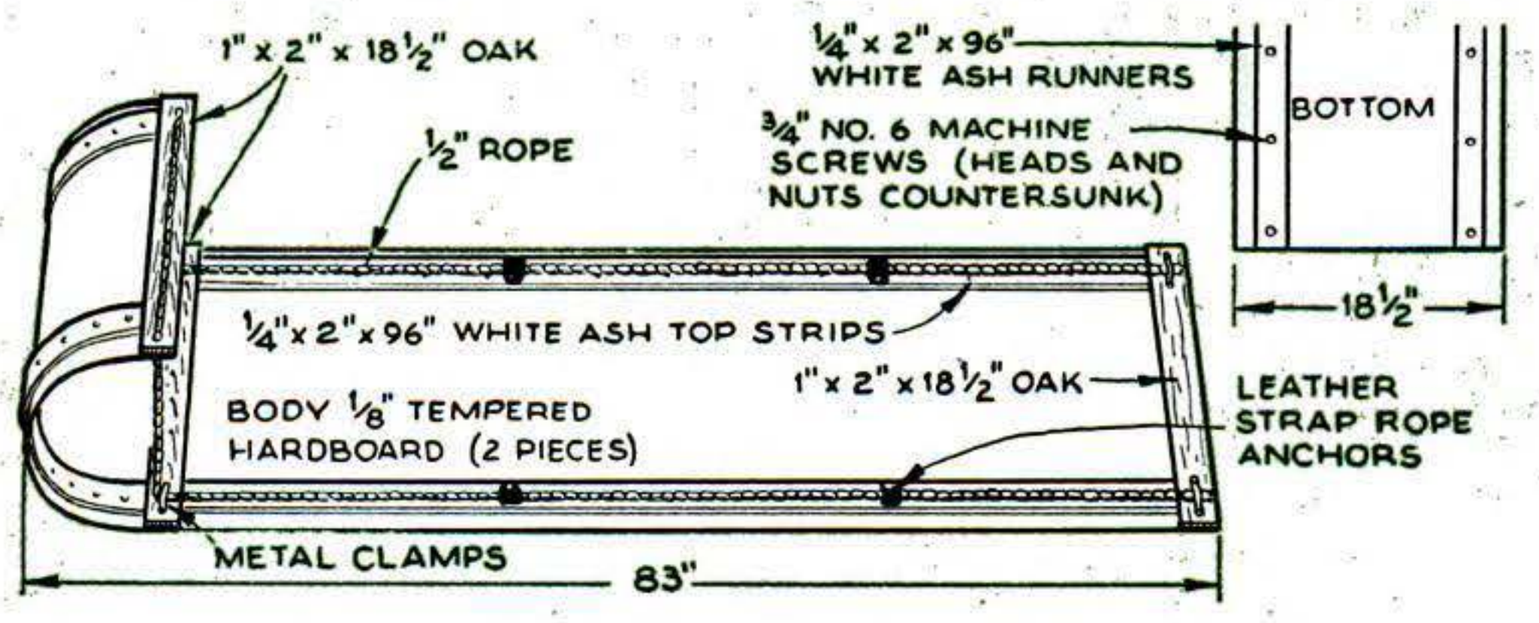
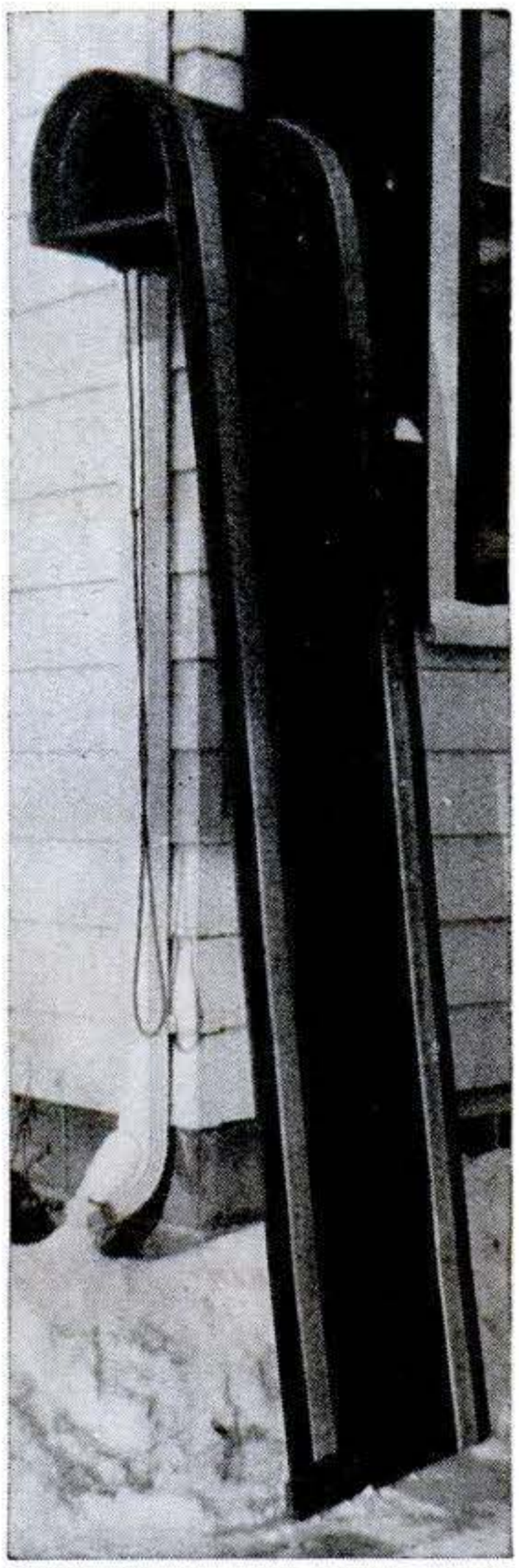




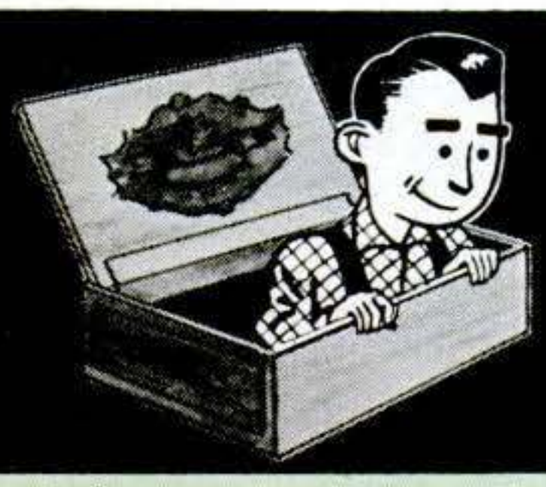
Toboggan Made of Laminated Hardboard

Two pieces of ⅛" hard composition board, bolted and glued together, form the main part of this toboggan.

To duplicate it, soak one end of each of the hardboard strips (I used Tempered Presdwood) in water for 48 hours. Soaking softens the hardboard so that it can be formed. Then bend the soaked ends around a form that has an 11" diameter. Bend the hardboard with the rough sides against the form. Clamp the ends to the form and let them dry. They'll keep their curved shape. Duplicate the soaking and bending with the white-ash runners.

Assemble the hardboard, runners and top strips with clamps and drill for machine screws. Then reassemble the parts with glue and the screws.

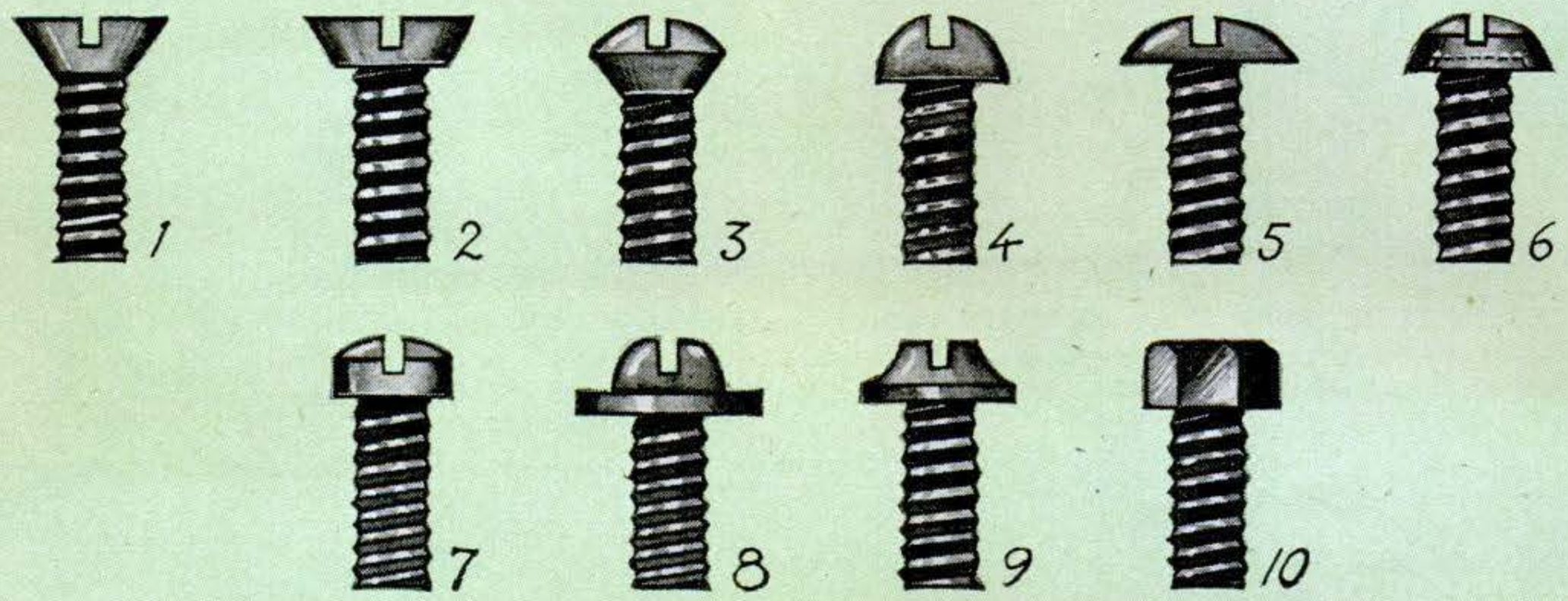
Bolt the oak cross strips in place and fill over the countersunk heads and nuts of all the bolts. A coat of clear penetrating sealer finishes the toboggan.—*W. F. Strelow, Appleton, Wis.*



CIGAR-BOX QUIZ

Dig into the cigar box and try to identify these screws. Invert the page to score yourself.

By C. B. Colby



1. Flathead; 2. undercut flathead; 3. oval-head; 4. round-head; 5. oven-head; 6. binding-head; 7. oval-fillister-head; 8. washer-head; 9. clock-head; 10. hexagon-head.

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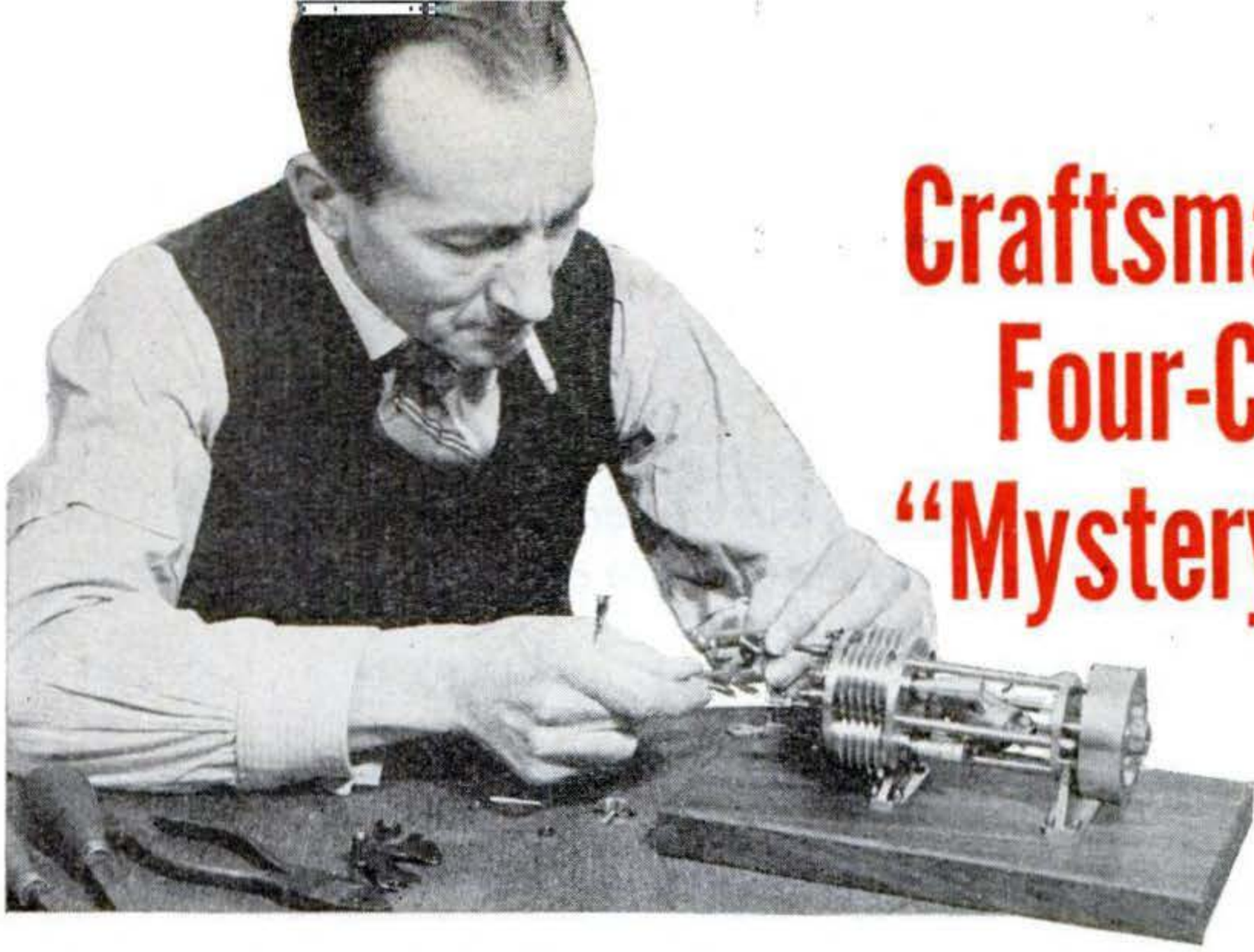
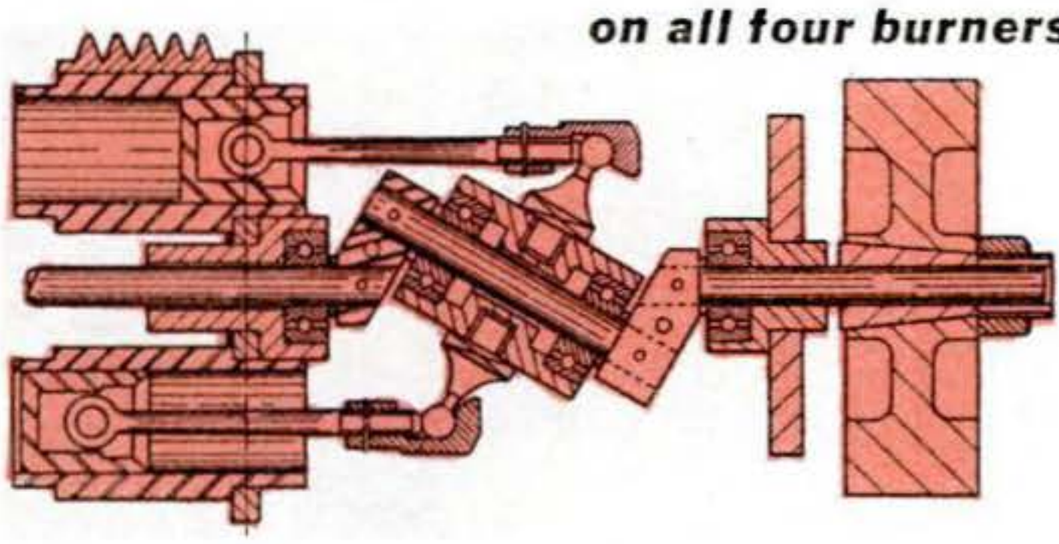


Craftsman Builds Four-Cylinder "Mystery Engine"

Here's a tricky piece of home machining that really cooks on all four burners—and take a look at the Z-type crankshaft.

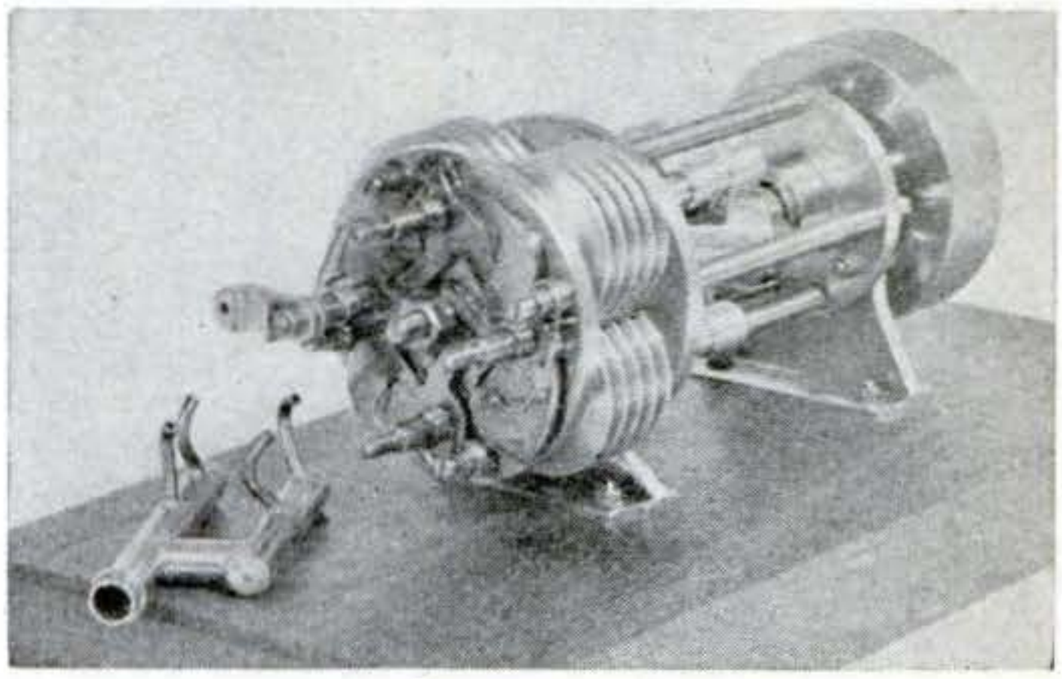


ANY model-engine fan could tell you that this one isn't a gasoline, Diesel, steam or hot-air engine. Both its principle and its design are unusual. The four cylinders work on a common crankpin. There are only four valves, each with a gas flame before it.

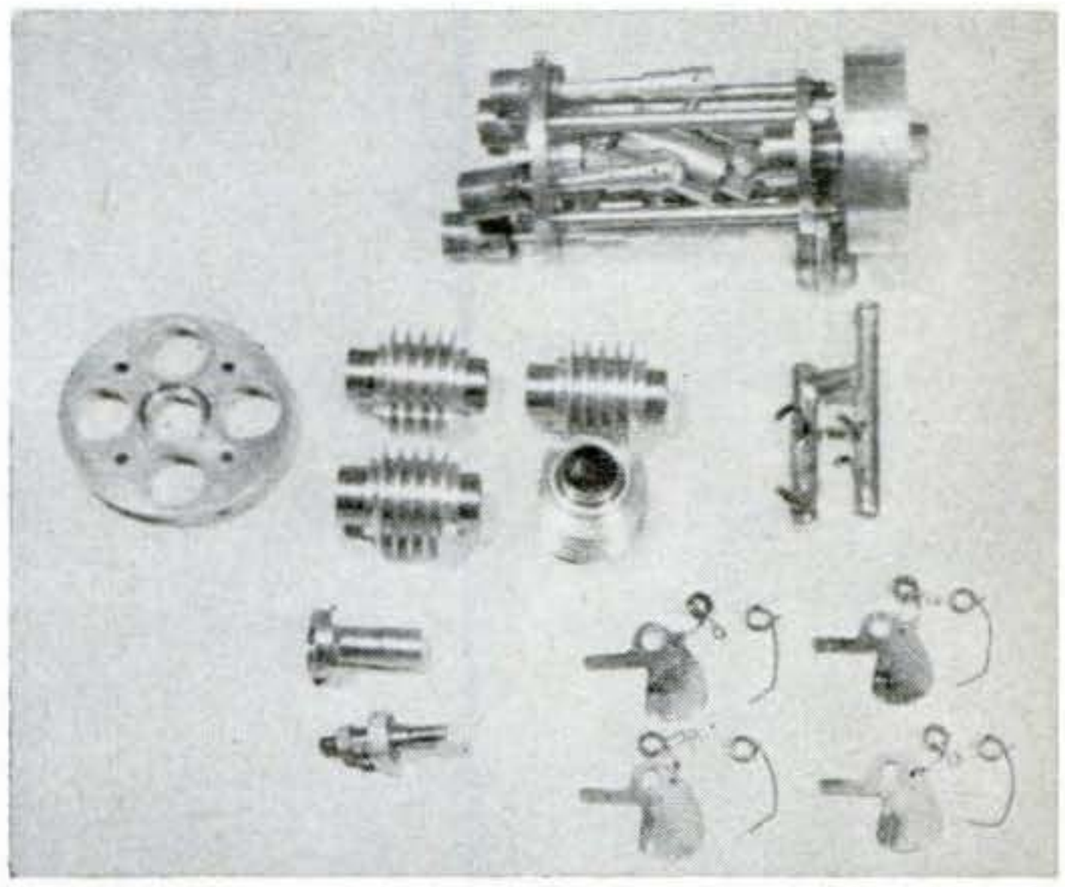
Built to high standards of precision by R. J. Harrison, a goldsmith of Southborough, Tunbridge Wells, England, the engine works like PSM's "Mystery Engine" (Feb. '50, p. 206). Flame is drawn into the cylinder on the inward stroke of the piston. Then the valve closes, the gases inside cool and atmospheric pressure pushes the piston out. Actually, it is an atmospheric engine.

An unusual Z crank converts piston action to rotary movement. The piston rods are connected by ball-and-socket joints to four studs in a ball-bearing sleeve on the inclined crankpin. A fifth stud, fitted with a roller to slide between two guide rods, keeps the sleeve from turning and the rods from twisting out of alignment.

The engine takes several minutes to warm up. When running it sounds like a two-cycle gas engine because gases trapped at the end of the power stroke pop the valves open. END



SHUTTER VALVES closing ends of cylinders are driven by a single-lobe cam on end of crankshaft. Angles of burner jets (in foreground) are critical, were set after many experiments.



TOP SKILL went into construction. Steel cylinders have finned duralumin sleeves shrunk on. Case-hardened, lapped valves (lower right) are held against cylinders by springs. Piston rods are linked to nonrotating sleeve (upper right). The sleeve oscillates.

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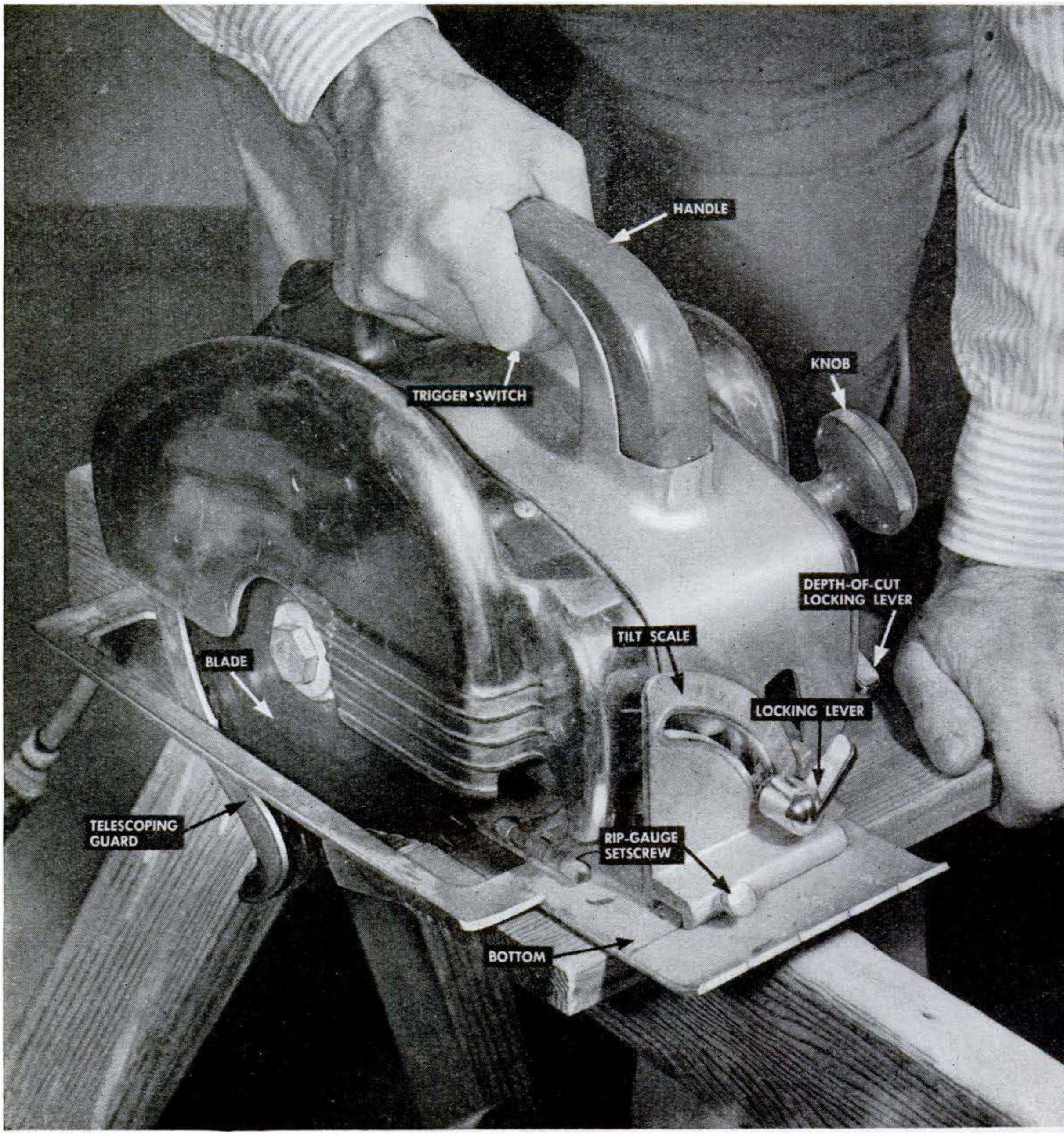
All About Portable Saws

Working out-of-doors away from your basement workshop? Quit pumping a handsaw and let a portable electric saw make short work of long boards.



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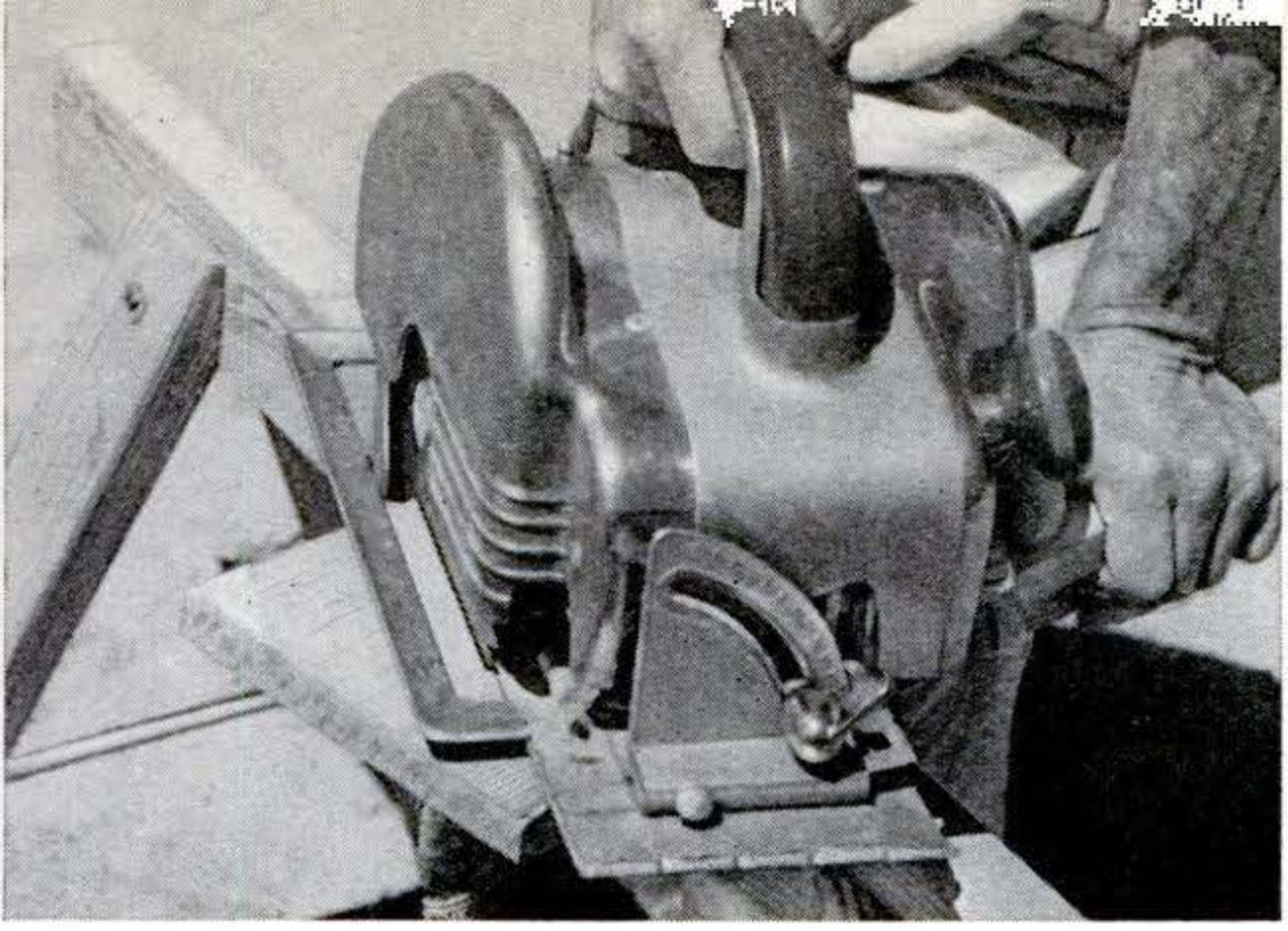
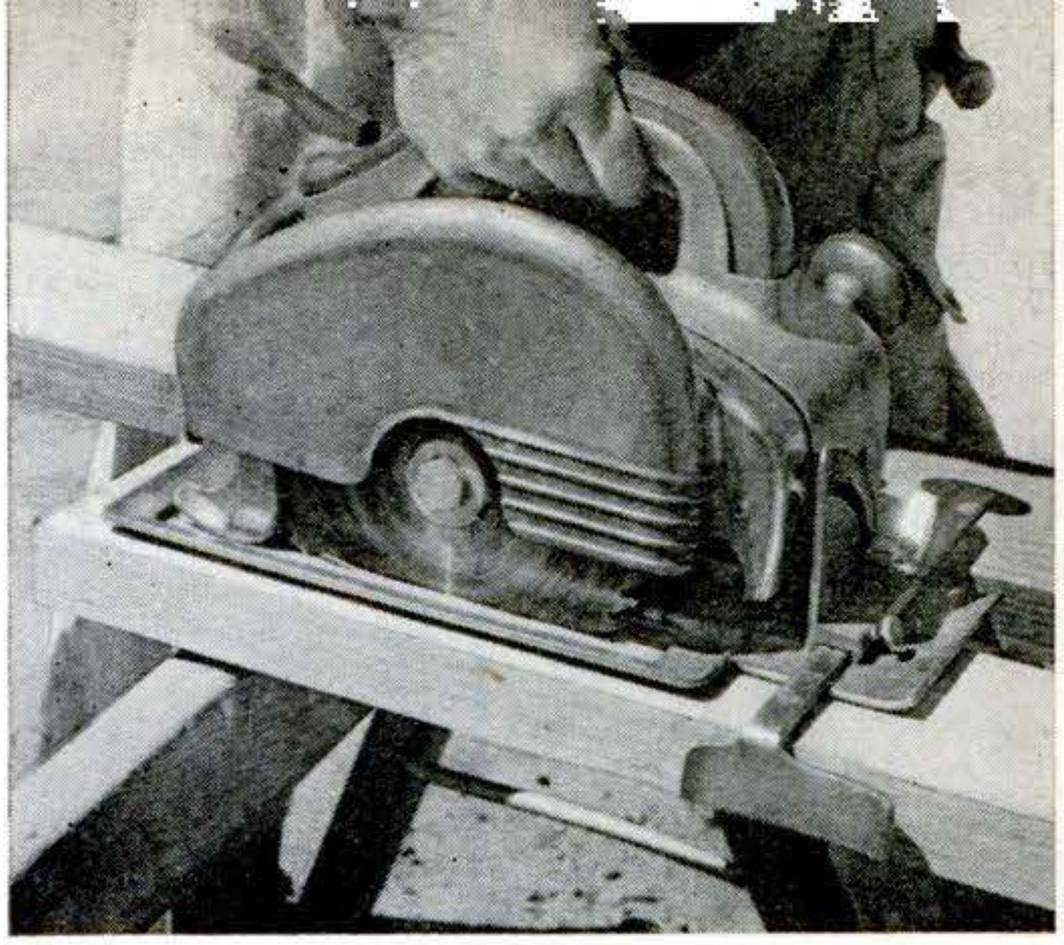


DIAGONAL CUTS and square cuts on board ends can be made by following a pencil line. Set blade to project slightly below the board. Rest saw on supported side of the cut. Watch from side away from flying sawdust.



RIPPING. Rip gauge is used to guide saw when cutting with grain. If board pinches as cut progresses, drive wedge into kerf behind blade. Support work on horses, cutting up to horse and shifting board to proceed.

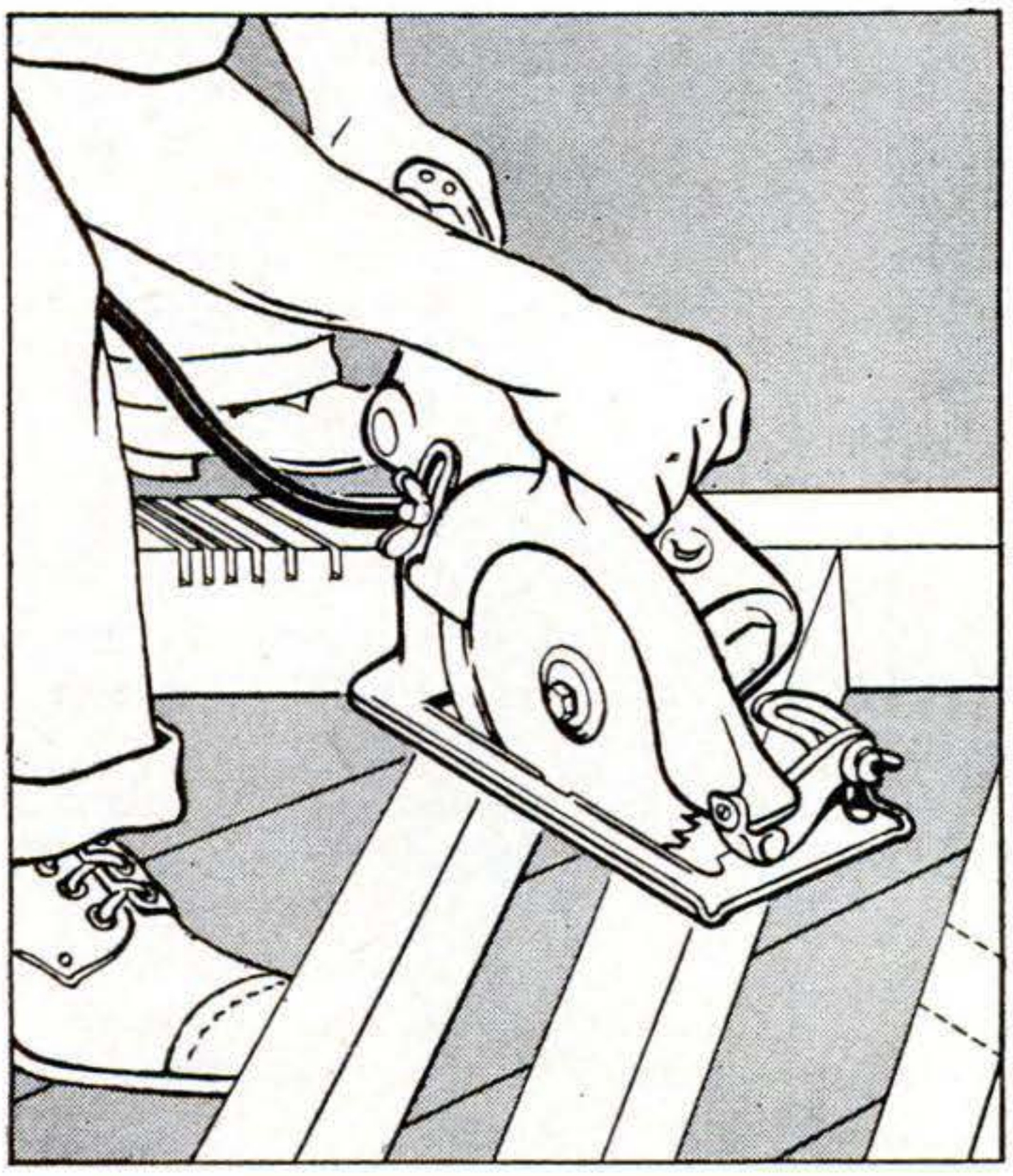
By Edwin M. Love

PERHAPS you are one of the horde of handy men who are building a home during free hours, or at least adding a carport, fence or garden furniture to the grounds. If so, you *need* a portable electric saw.

You can take it right to the job—up on the roof to cut a hole for a cooling vent, or into the attic to frame up a spare bedroom. It will multiply your cutting speed by 10. It will do a cleaner, more accurate job than a handsaw. And as a dividend it will cut cement block or brick for your incinerator, or asbestos board for a fireproofing job.

The size for you. Probably the smallest useful size is the 6″ one (saws are classified by blade diameter), which will cut square through two-by-fours and bevel ¾″ boards. Lightness of the 6″ models in overhead

NOTCHING FOR WALL BRACES. Nail wall studs to plates for raising an assembly. Mark for notching by laying diagonal brace in place and marking both sides. Set saw cut to brace thickness and make outer cuts plus several more in between to facilitate chiseling.



ROOF SHEATHING may be applied rough and trimmed later. To cut hip in roof sheathing, tilt saw to bisect hip angle and saw down guide line. Board ends will snap into place as they are cut. Trim one slope before you start laying another.

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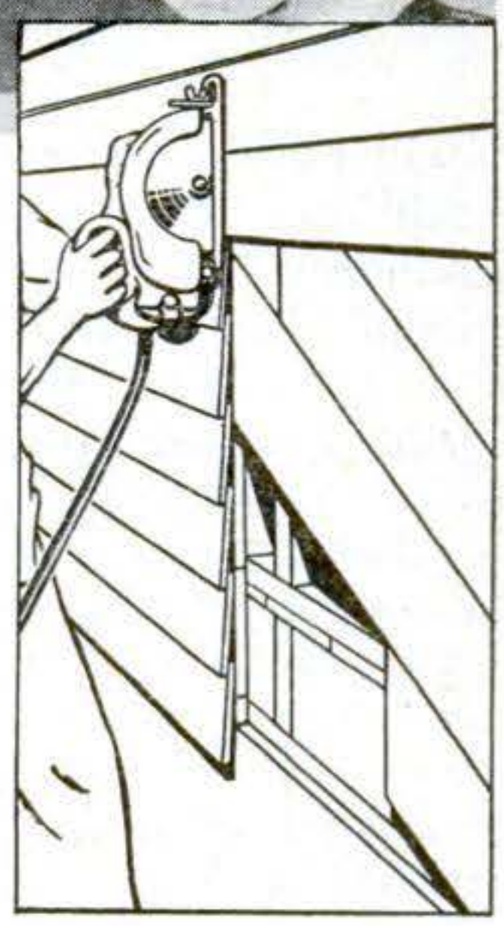
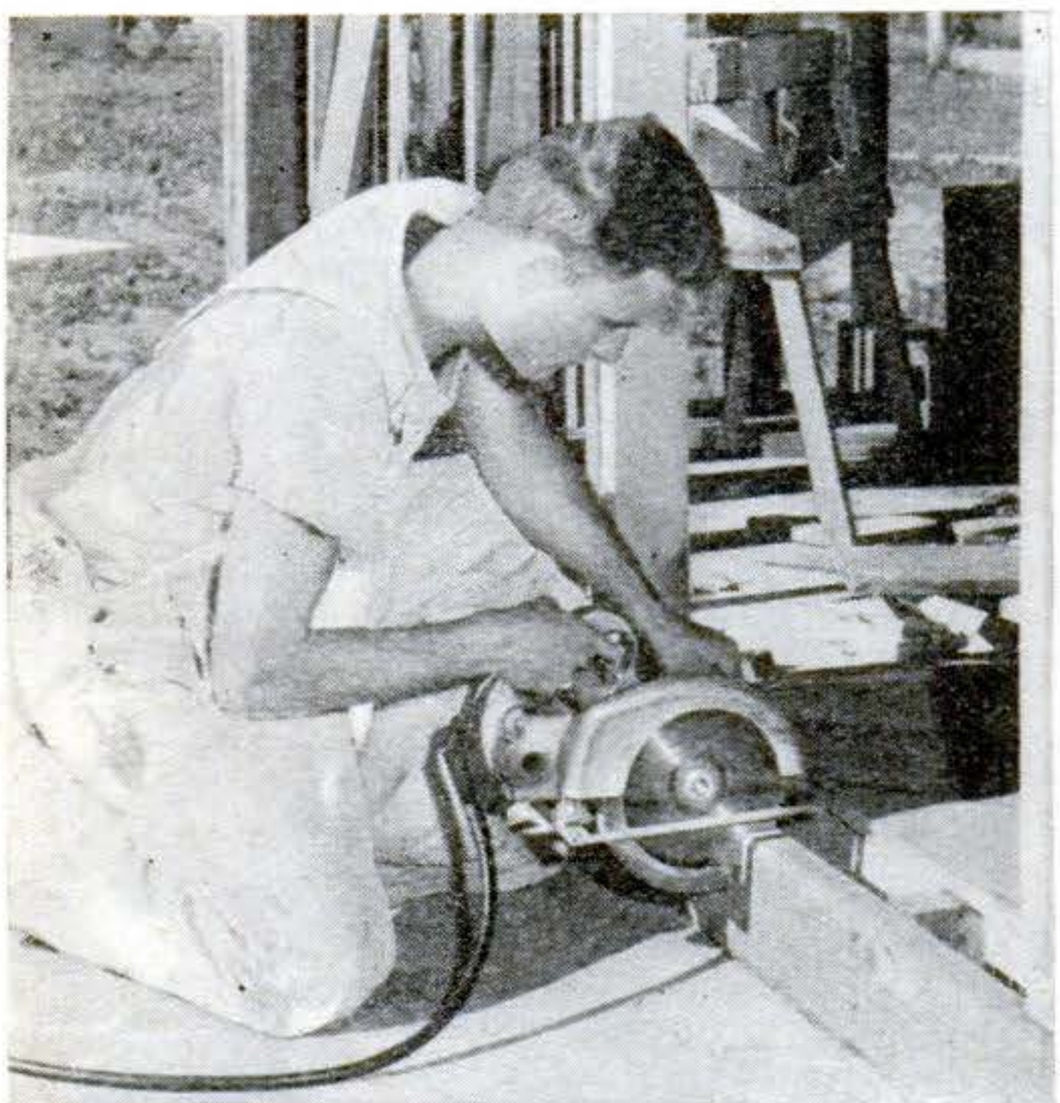


CUTTING HOLES in roof sheathing for vents (above) is accomplished by resting toe of saw on boards and slowly lowering blade as it cuts through. Saw is advanced to make first cut, then other three sides of opening are similarly cut. Remodeling is easy as saw cuts doors and windows in existing walls (right). Use a nail-cutting blade.



FITTING DOOR SILLS. Door sills must be sunk into subfloor to bring tops flush with finished floors. This is done by cutting strip from subfloor and kerfing the end joist to proper depth. Joist is then chopped out with a broad chisel to admit the sill.

or wall-cutting jobs is a real advantage. But for all-around usefulness and dependability, the 8″ portable saw is generally best. It will cut vertically to a depth of about 2¾″ and put a 45° bevel on a 2″ board. These models weigh around 20 lb.

Using a portable saw. This is as easy as falling off a board—especially if you're on the outer end of the board you're cutting. Just rest the leading edge of the saw on the work and advance it, steering the blade along a pencil line with the right hand, steadying it with the left.

Don't force the saw but let the blade cut its way forward. If it stalls, draw back at once, let the blade come up to speed again and advance it. To save the switch and motor, always start and stop with the blade running free.

Most saws are equipped with an adjustable rip gauge. Use it when making long cuts with the grain. Where the cut is too wide to use the rip gauge, clamp a wood strip on the work to guide the saw.

Extension cords. Working outdoors may put you some distance from your power source, requiring an extension cord of some length. A light cord will cause a voltage drop that will reduce the power of your saw. The data card with this article lists the wire needed for various distances.

Safety precautions. Fuse your lines according to the manufacturer's specifications. The cords of most saws are provided with a third wire (usually colored green) attached to the frame of the machine. In damp locations, and for complete safety anywhere, connect this wire to a water pipe or other ground to protect yourself from shocks caused by grounds in the motor.

Special blades. There are blades for practically any purpose and any material. The combination blade is the all-around woodworking blade for the homeowner. It cuts cleanly across the grain and can also be used for ripping. Crosscut blades and rip blades should be used, however, when much of either kind of cutting is done. Fine-toothed blades are efficient for soft wallboards or thin plastics.

There is a blunt-toothed friction blade for cutting light-gauge flat or corrugated iron sheets such as metal roofing. A flooring blade, 1″ or 2″ smaller than the regular blade, is useful for cutting into walls, flooring or old lumber—it munches through the nails along with the wood.

Some portable saws, not all, will take a

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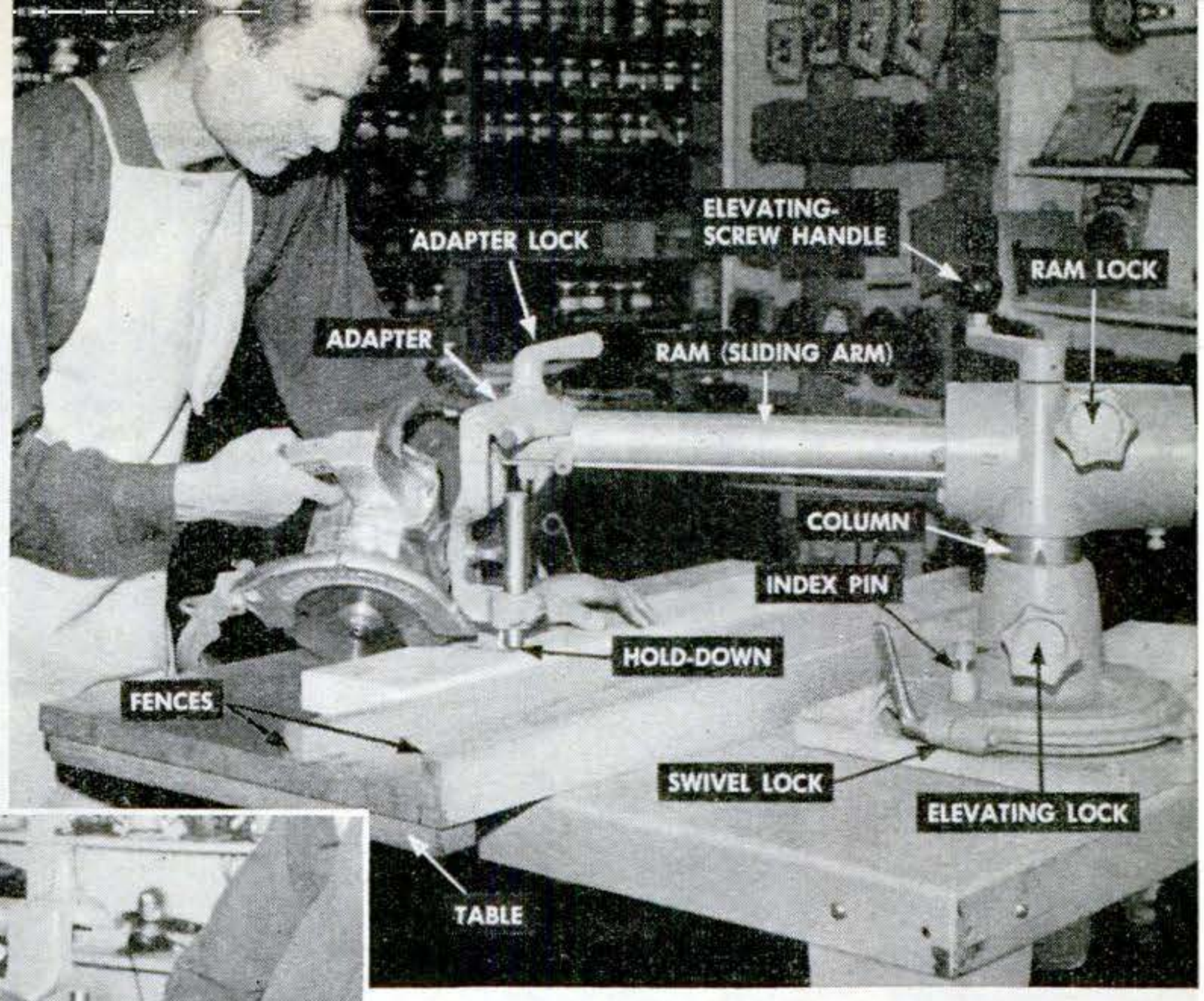
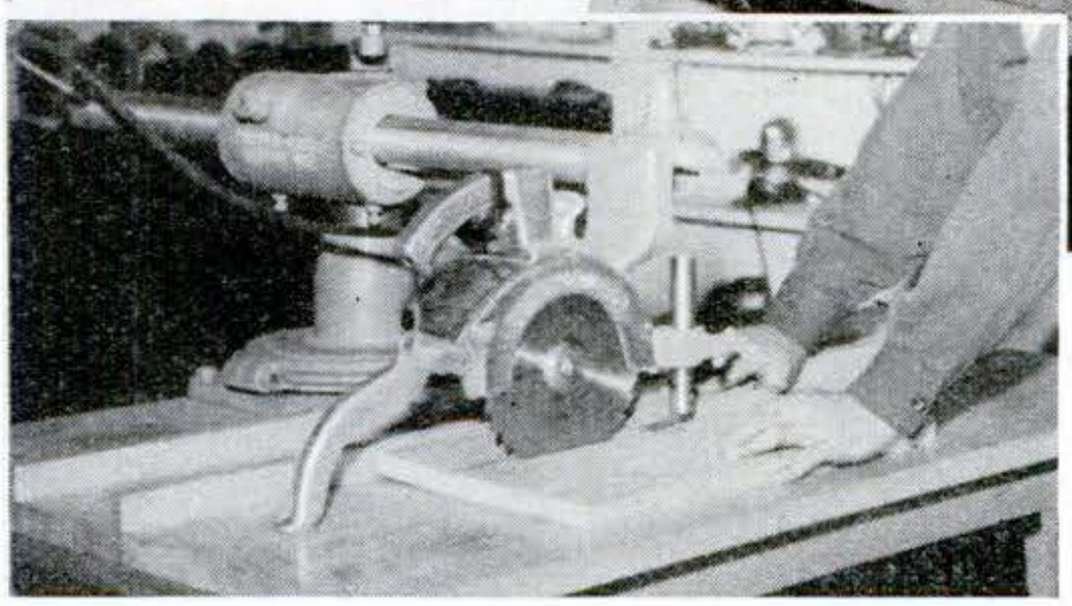
RADIAL-ARM SUPPORT, fitted with adapter, quickly converts portable saw to radial saw for use in the workshop. At right, a compound miter is made by tilting the blade and setting the column for a diagonal cut. Below, saw is set at 90° to column and work pushed into it for ripping. Adjustable hold-down keeps the work from jumping up as it is being cut by saw blade working from above.





dado cutter. These are especially useful in setups using a radial-arm support or radial guide.

Carbide-tipped blades outwear dozens of ordinary blades in wood cutting. They will also handle asbestos-cement board, insulating brick and many types of asphalt siding and roofing materials.

Abrasive cutoff wheels extend the uses of your portable saw to cutting concrete, terra cotta, firebrick, tile, marble, slate, cast iron, nonferrous metals and bakelite, and also scoring granite for breaking.

Saw care. Very little maintenance is needed to keep a portable saw operating. Lubricate it regularly according to the manufacturer's instructions and blow sawdust out of the motor compartment occasionally, more often if the machine is used under dusty conditions. It is equally important to keep the blade sharp, well set and free of pitch deposits.

Next Month: How to build cutting jigs and special attachments for a portable saw.

WIRE SIZES

FOR PORTABLE ELECTRIC TOOLS

This table is for 115-volt tools. For 220 volts use the wire size recommended for only half the actual distance. The wire sizes will deliver current equivalent to 150 percent of the full-load requirements of the tool, with a loss in voltage of not more than five volts.

Full-load ampere rating of tool	0-2	2.1-3.4	3.5-5	5.1-7	7.1-12	12.1-16
Distance from power source	Wire size (B & S gauge)					
25 ft.	18	18	18	18	16	14
50 ft.	18	18	18	16	14	12
75 ft.	18	18	16	14	12	10
100 ft.	18	16	14	12	10	8
200 ft.	16	14	12	10	8	6
300 ft.	14	12	10	8	6	4
400 ft.	12	10	8	6	4	4
500 ft.	12	10	8	6	4	2
600 ft.	10	8	6	4	2	2
800 ft.	10	8	6	4	2	1
1,000 ft.	8	6	4	2	1	0

Note: If voltage is already low at the source, have voltage increased to standard, or use a larger cable than listed.

Source: Black & Decker handbook *Use and Care of Portable Electric Tools.*

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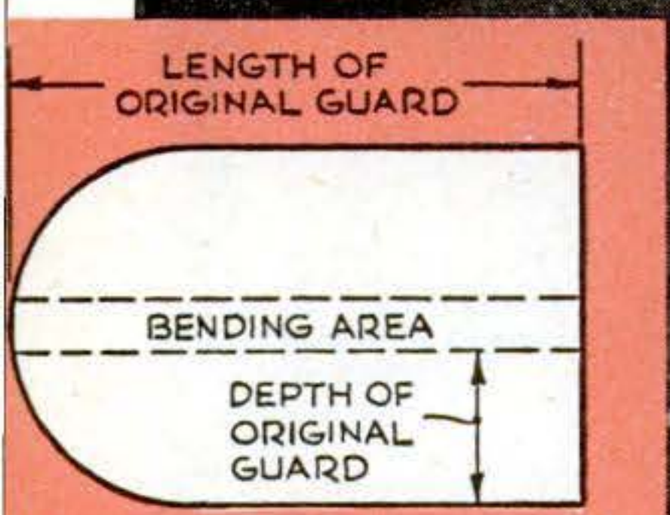
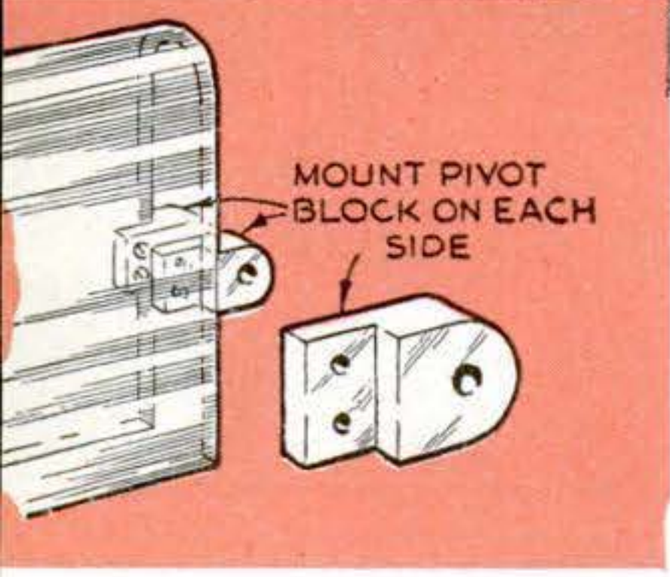
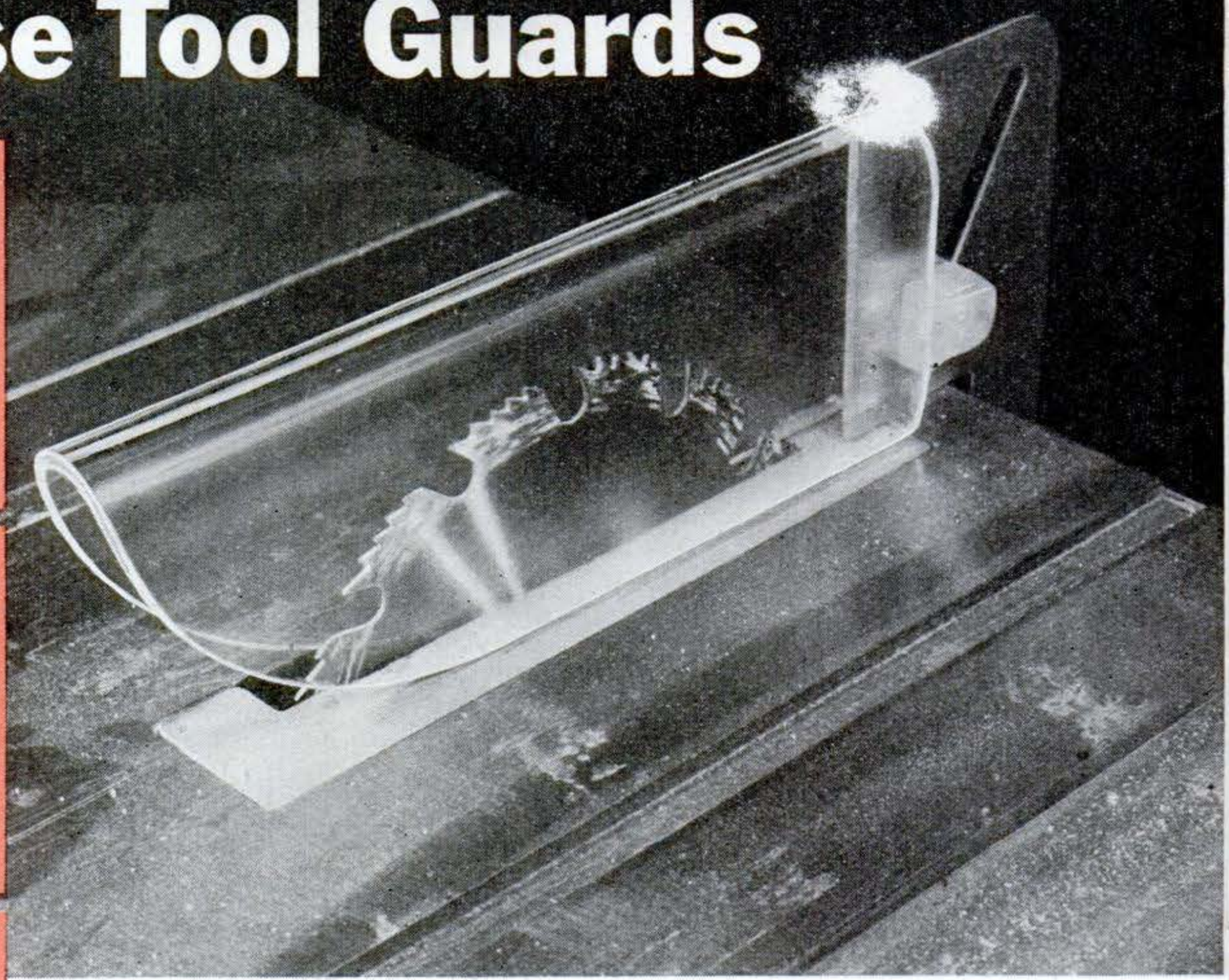
You Can See Through These Tool Guards







TRANSPARENT SAW GUARD is cut from ¼" acrylic, heated in oven, then draped over rounded wood form. By softening only center strip (over steam pipe or with electric strip heater), you can shape guard by hand. Pivot blocks are two thicknesses glued together.

Eyes and fingers are protected by plastic shields that keep work visible right to the cutting edge.

By Will Thomas

YOU may have reactions as fast as Billy the Kid's, but you still can't dodge a fast-flying sliver of wood or the steel-cored spark from a grinding wheel. Power-tool users are up against a triple-horned dilemma something like this:

- Sure, chips are dangerous.
- But goggles are a blankety-blank nuisance, annoying to wear and never on hand when needed.
- Guards hide the work. If you can't see what you're doing, how can you do it?

Most of us resolve this by "being careful." This means removing the guard (if the tool has one), forgetting to wear goggles nine times out of 10, squinting when things fly around, and hoping to get away with it.

Plastic is the answer. You can have a guard that protects fingers as well as eyes, but lets you see what goes on right where it counts—at the tool edge. Acrylic plastic (Lucite or Plexiglas), which can be heat-formed to any simple shape, does the trick. It need only be thick enough for reasonable stiffness—⅛" to ¼" stock is fine. It can be worked with tools you already have, is tough, shatterproof, clearer than glass, and requires no framing.

What machines need them? Almost any power tool will be better with a guard,

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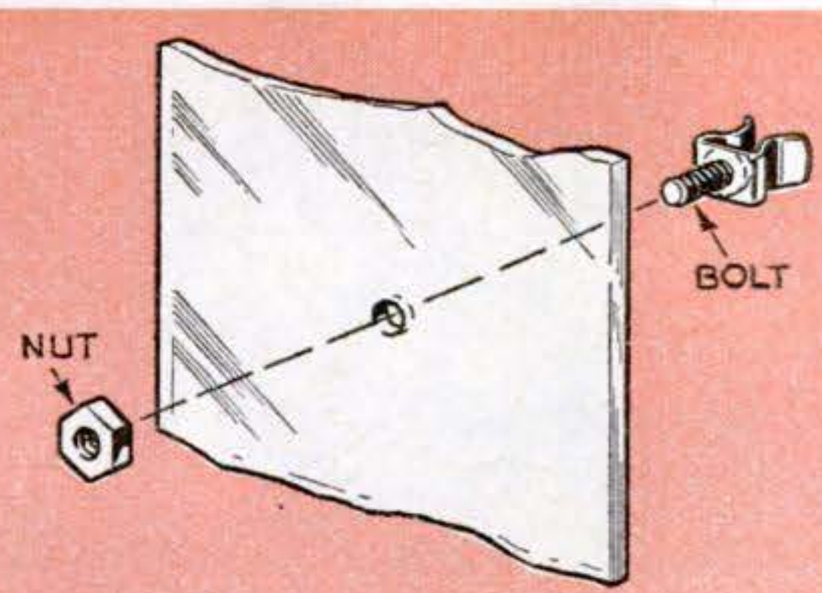
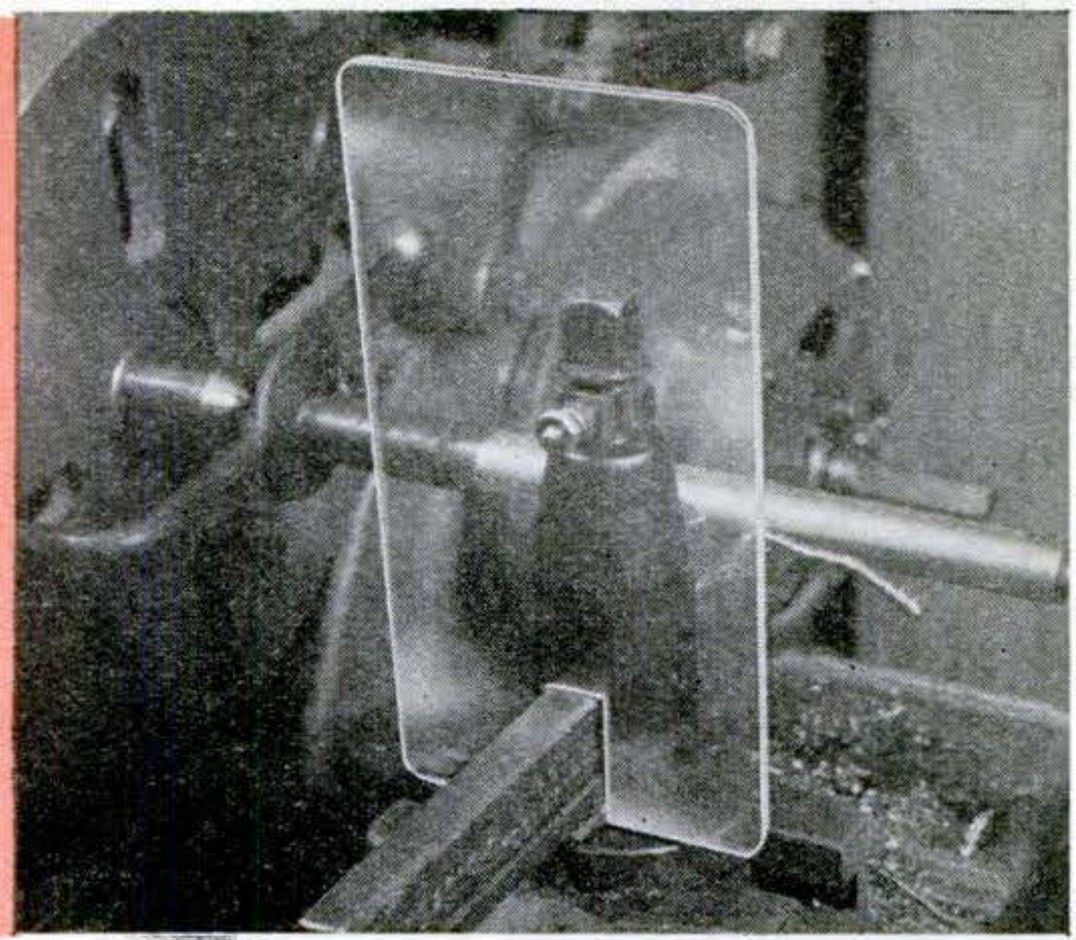
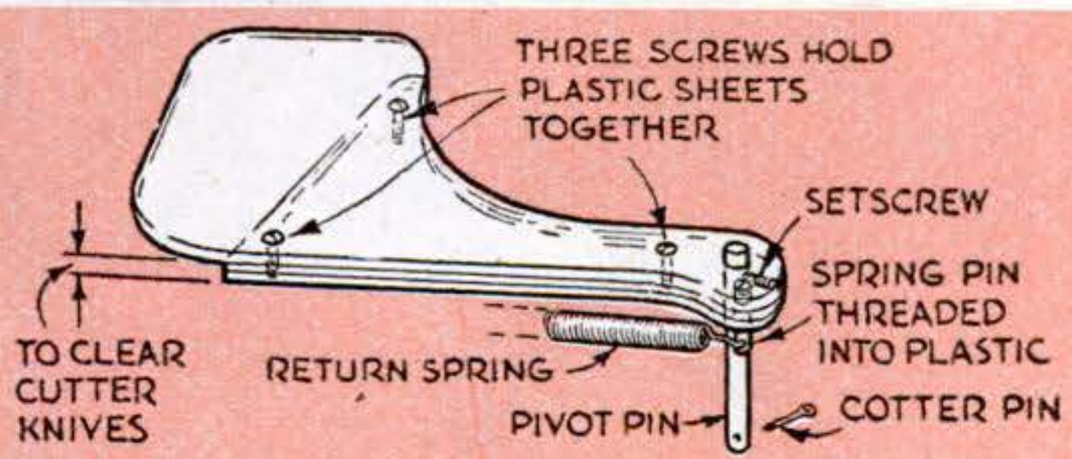
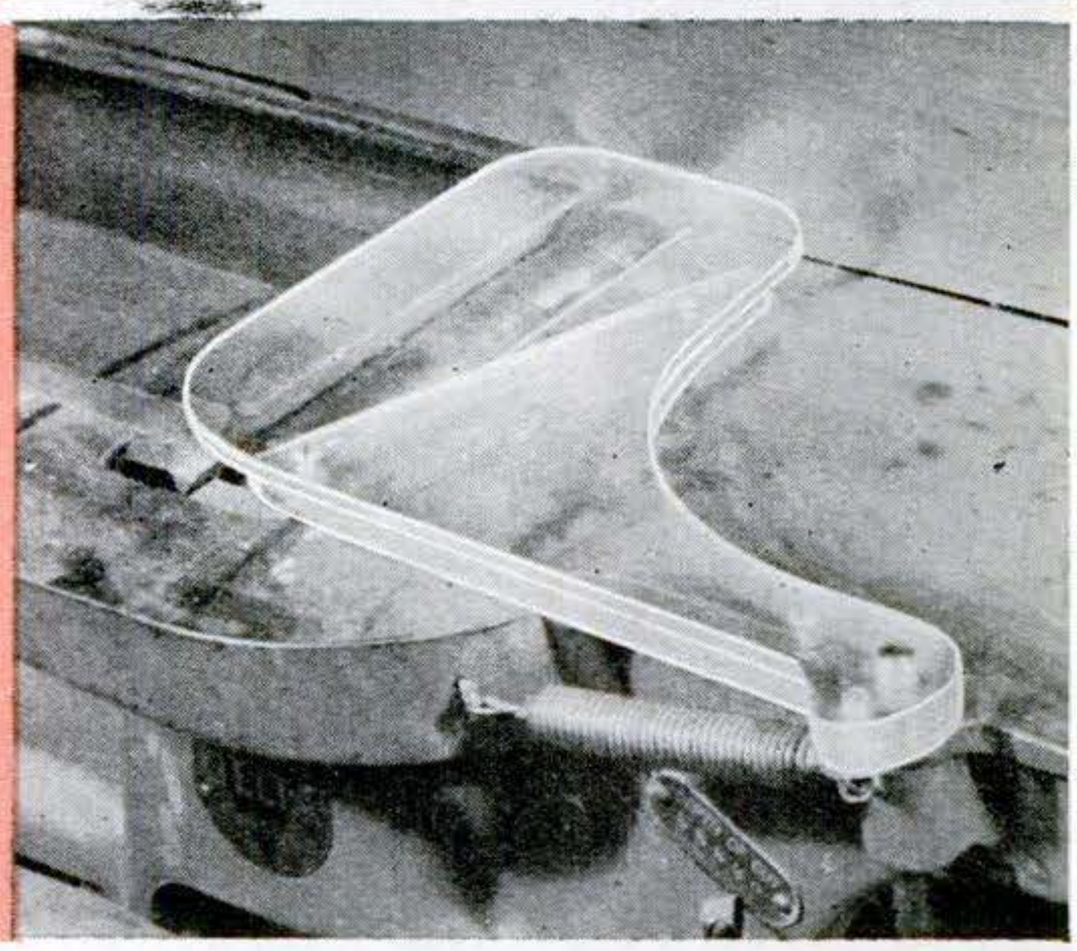


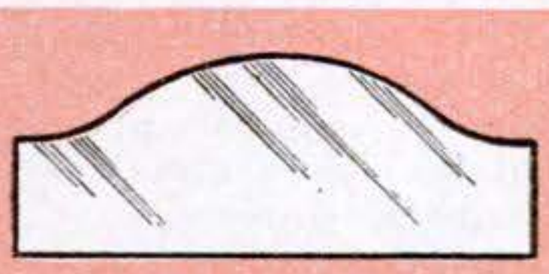


FLYING CHIPS won't reach you with a simple guard like this on lathe tool post. Notched at bottom to fit over tool holders, guard cut from 1/8" sheet has a clip at its center that snaps around tool-post clamping screw.

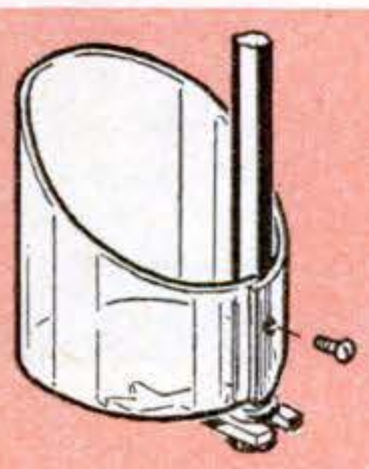


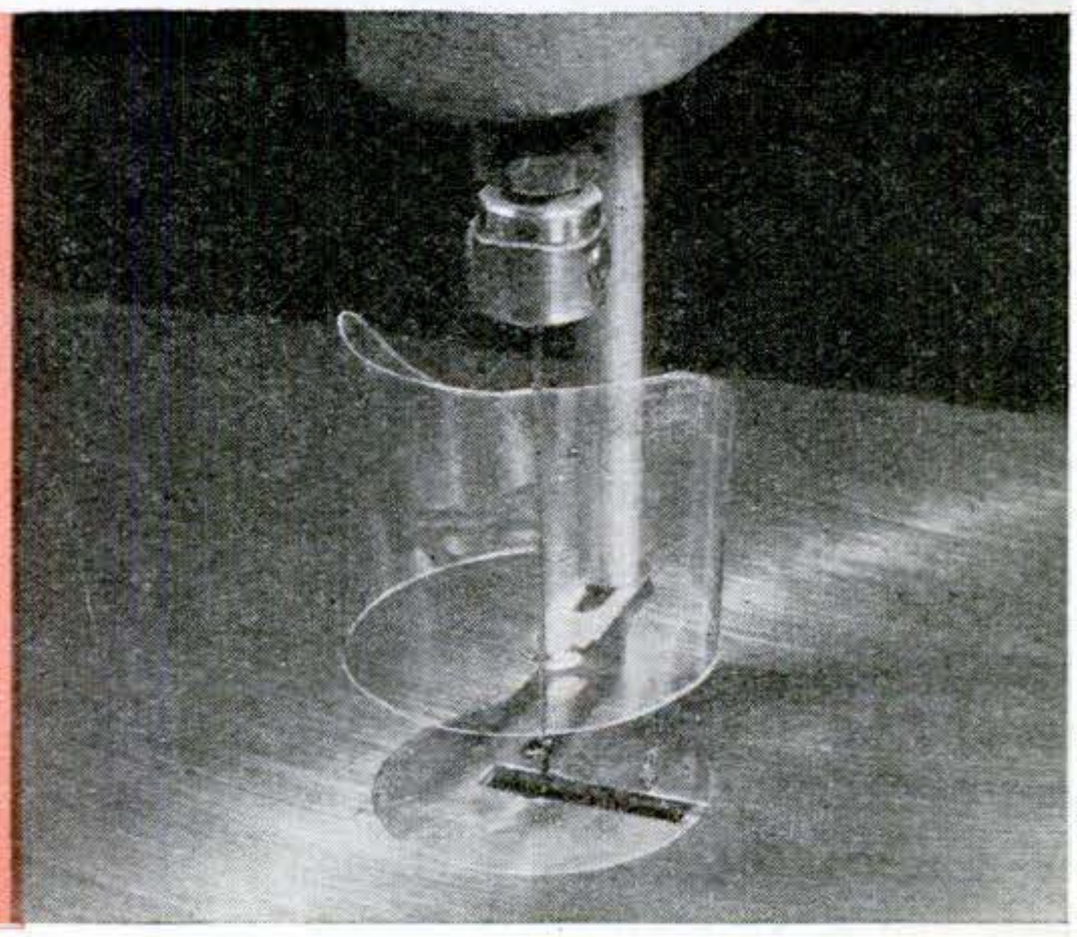


JOINTER KNIVES show through this plastic guard, and you can see the cut at the edge of the work. Same size as original metal guard, plastic one is made of three pieces held together with screws, the bottom two thick enough to prevent knives from striking top one with table at maximum depth. Steel pivot pin is held by setscrew in threaded hole.



SHAPE OF PIECE BEFORE BENDING





FINGERS ARE SAFE, but you can see through this jigsaw guard, especially recommended if children are permitted to use the machine. Thin plastic is shaped while hot around a tin can or smooth rolling pin to a diameter that will allow it to slide around upper arm of the saw. Guide support is drilled and tapped for mounting screw that holds guard.

but the following classifications may help.

Musts: Hand-fed power tools with high-speed cutting elements, such as circular saws, jointers, bench grinders, tool-post grinders and cutoff wheels.

Likely candidates: Some tools ordinarily not fitted with guards would be safer with them. Drill presses, flexible shafts, wood shapers, bandsaws and jigsaws are examples. Put them on the "must" list if children or beginners use them.

Optionals: Hand grinders, metal-turning lathes, metal-working shapers and milling machines do throw off chips or sparks at times. A smoking steel chip can make you plenty hot under the collar if it gets inside

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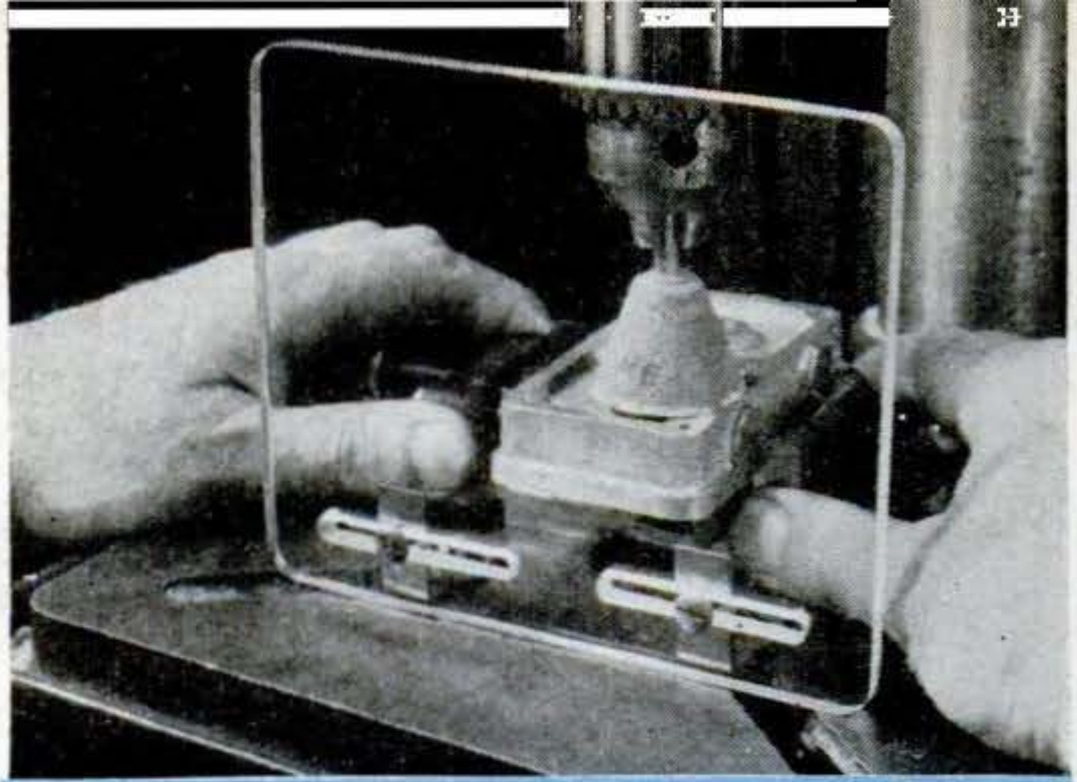
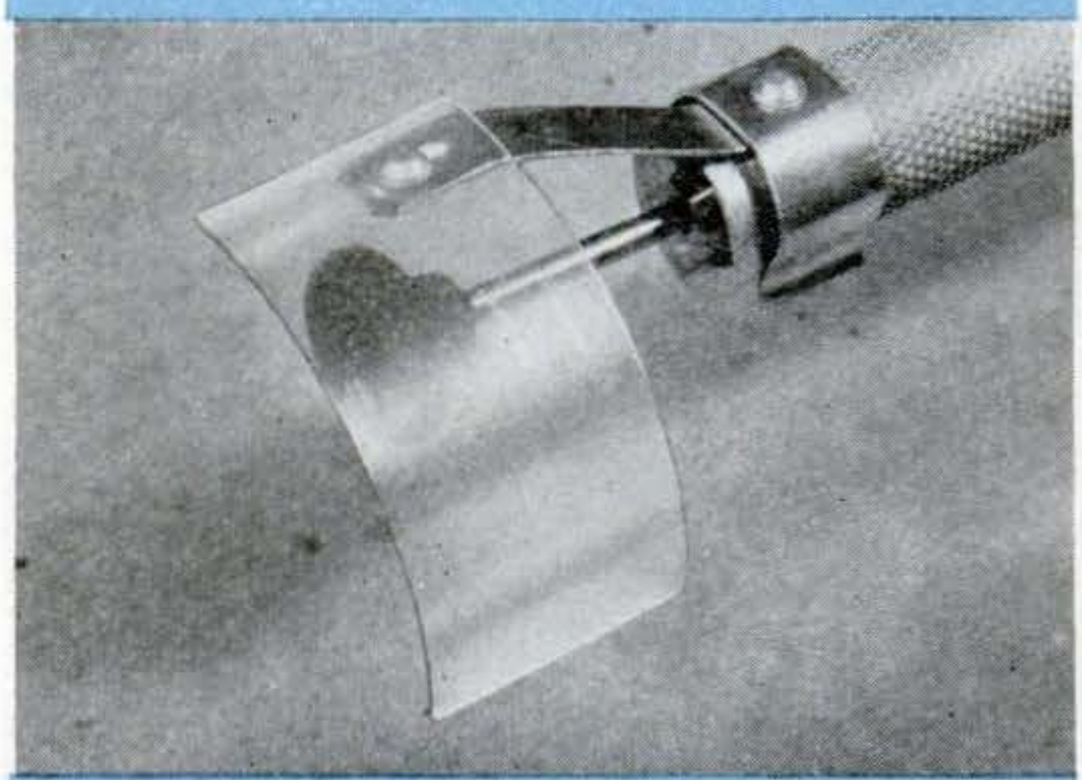
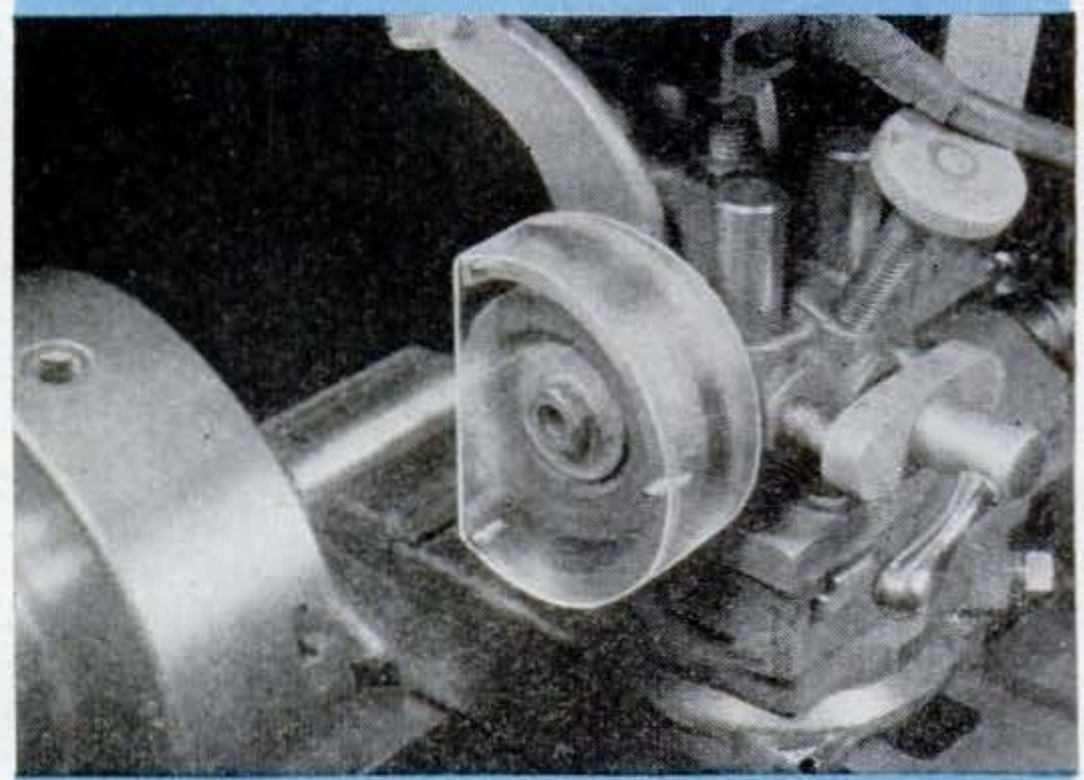


PLASTIC SHIELD protects your eyes when surface grinding is done on the drill press. Two angle brackets are bolted to the table through the table slots. Slots in the plastic permit adjustment of guard to any desired position.

COMPARE REGULAR GUARD (the left one) with the homemade plastic guard at the right. Requiring no frame to hold it, it leaves entire wheel visible, creates no blind spots. Piece of ¼"-thick acrylic attaches with two screws.



CLIP-ON GUARD for flexible shaft makes goggles unnecessary when grinding or using small steel cutters. Heat a small rectangle of 1/16" or 3/32" plastic and shape it around a tin can that is about twice the diameter of the biggest wheel used. Rivet plastic to a metal strip, and the strip to a spring clip that snaps on the handle.



GRINDING CAN BE WATCHED through plastic guard on this tool-post grinder, giving better control up to shoulders and on other close work. Built just like the original metal guard, plastic one consists of a center section shaped around a wooden form, an inboard piece cemented on, and an outer cover held on with screws.

your shirt—and I have had it happen to me.

Making the guards. A guard furnished with the machine may serve as a guide for making a plastic one, which can usually be attached with the same screws, clamps or brackets. If the tool has no guard, you can bend experimental ones from cardboard, and use the one you like best as a pattern for cutting the plastic. Use any sharp, fine-toothed saw. Plastic edges can be sanded, filed or scraped smooth.

Small scratches on the polished face are best left alone. If you sand them out, use very fine abrasive paper (such as 360-grade silicon-carbide), and then repolish the surface. Do this either with a buffing wheel and polishing compound, or by hand with an auto cleaner or lacquer-rubbing paste.

Holes can be made with twist drills (not wood bits) and threaded with ordinary taps, coarse threads being preferable. For gluing two pieces together, use an acrylic cement such as ethylene dichloride.

Bending plastic. Lay the cut piece on a smooth surface (such as a piece of sheet metal or a rack made by stretching cheesecloth over a wooden frame) and place it in the kitchen oven with the thermostat at 275°. Give it time to get really limp.

If the shape isn't right or the sheet takes on impressions from the form, pad the latter with flannel or smooth paper. Pop the plastic back into the oven and the imprints will disappear. Then reshape it. END

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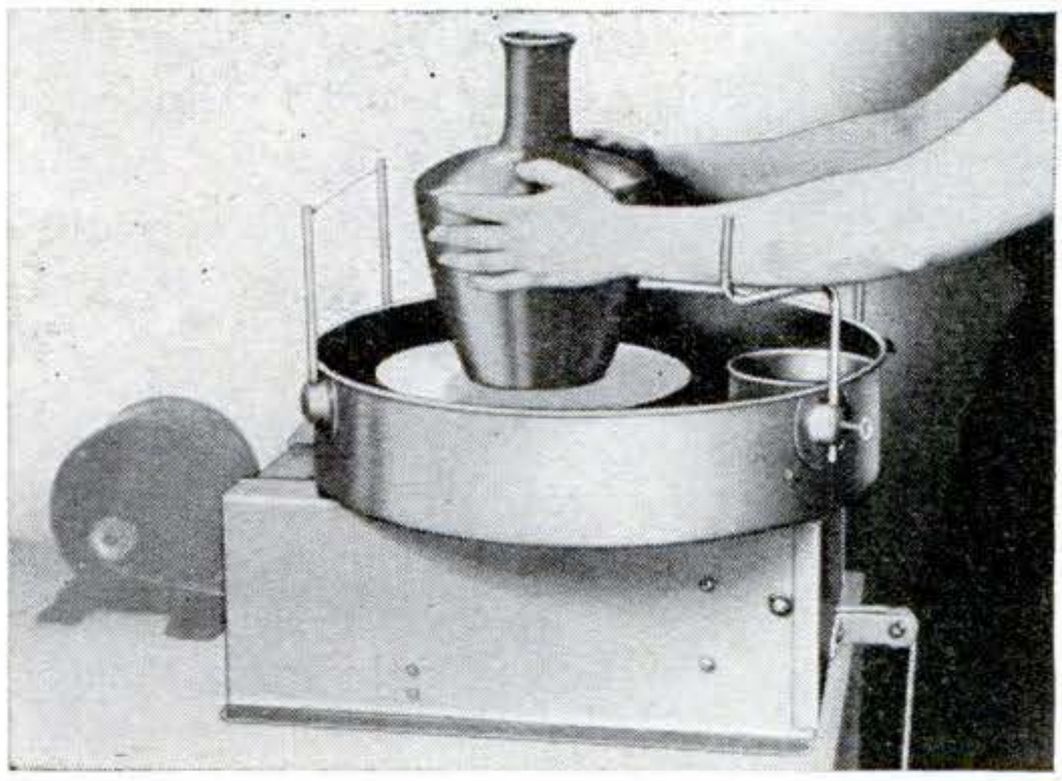
Potter's Wheel Also Cuts Gems

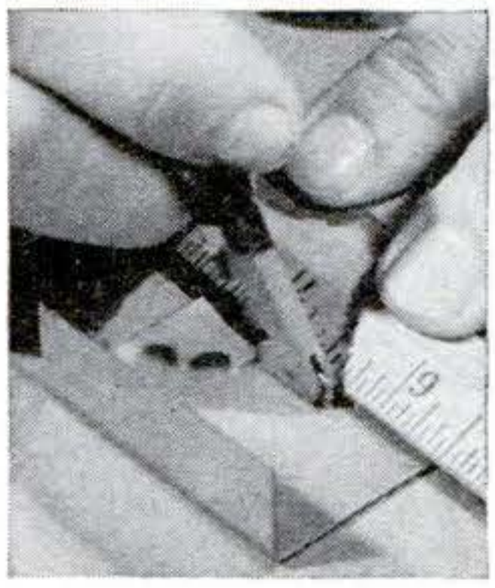
BESIDES handling most phases of ceramic work—wedging, throwing, banding, sanding and grinding—the Craftool (left) becomes a gem-cutting shop when attachments are added. It handles lapidary work from rough sawing to the final polishing.

While basically a potter's wheel, accessories convert the Craftool to a disk sander, belt sander, drill, ball mill, air compressor and flexible-shaft tool. It has one constant and two variable-speed shafts, giving a speed range from 40 to 1,800 r.p.m. Speeds are regulated by foot or hand control. It is made by Craftools, Inc., 401 Broadway, NYC 13.

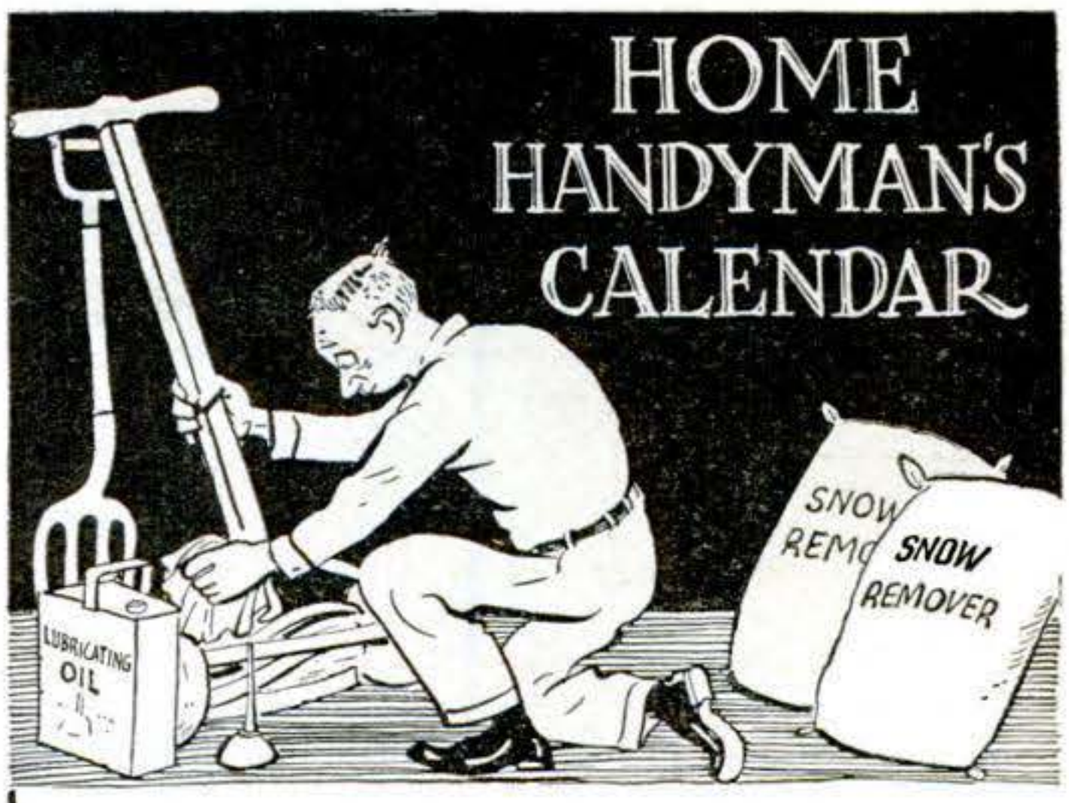
Another new potter's wheel (below) also has a foot speed control to give speeds from 30 to 150 r.p.m. It has a 10″ throwing head, an 18″ by 18″ table and is made by the Master Mechanic Mfg. Co., Burlington, Wis. Both wheels have ¼-hp. motors.



Glass Cutter Scores Sheet Metal



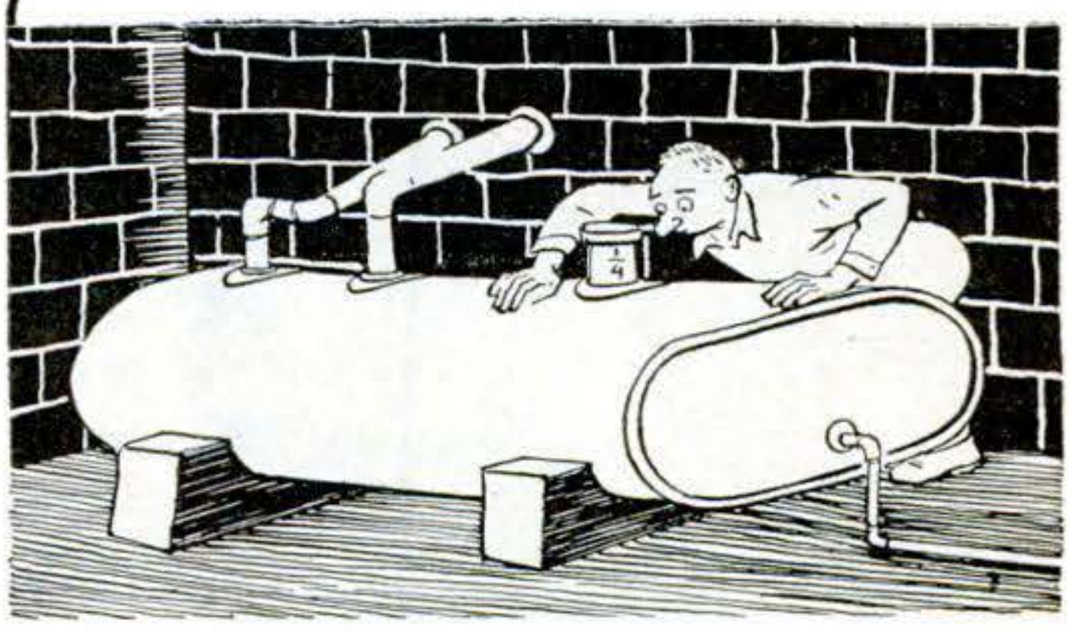
SHARP, perfectly square bends can be made in light sheet metal if it is first scored with a worn-out glass cutter. Use a ruler as a guide and score on the inside of the bend.—*Ken Murray, Colon, Mich.*



November brings Winter's first winds, sometimes with a touch of snow and ice. You won't need a lawn mower and other garden tools for quite a while. Be sure to oil them well to prevent rust before you store them away.

- Calk any cracks you can find in basement walls or foundation. Lay in a supply of sand, rock salt or chemical snow remover. When you need it you'll need it quick.
- Indoors, check all windows and doors for broken panes, cracked glass, crumbling putty, broken cords. If you haven't already done so, weather-strip doors and windows to eliminate drafts and cut down your fuel bill. Check the tightness of storm doors and sash.

- Outdoors, before winter strikes, place wire netting around trunks of fruit trees to keep hungry rodents away. Drain all pools, fill them with straw and cover with boards.
- Remember to keep your oil tank at least one-quarter full. Drain a steam or hot-water heating system and refill with fresh water. Check a forced-hot-air furnace to see if filters need replacement.



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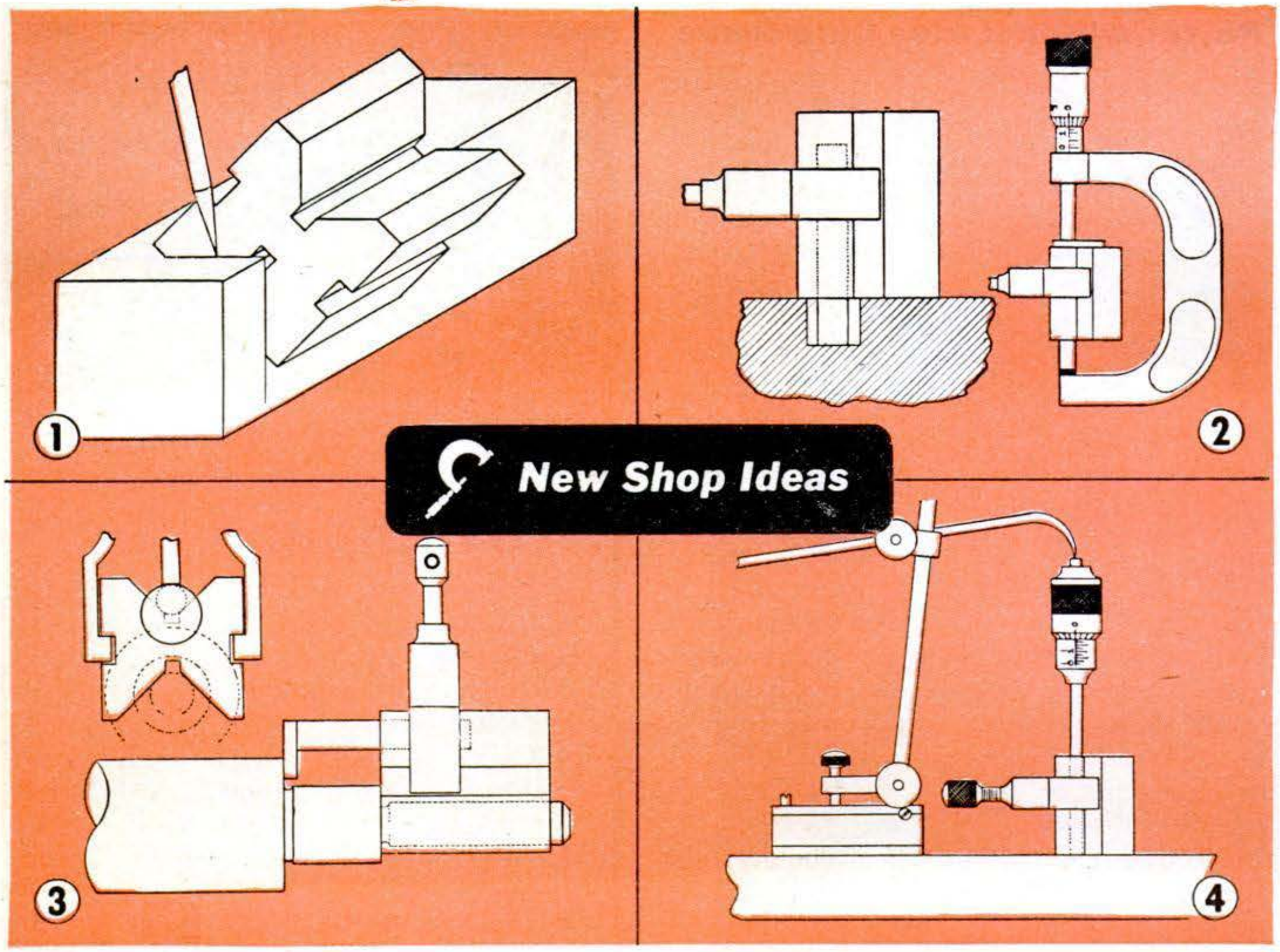


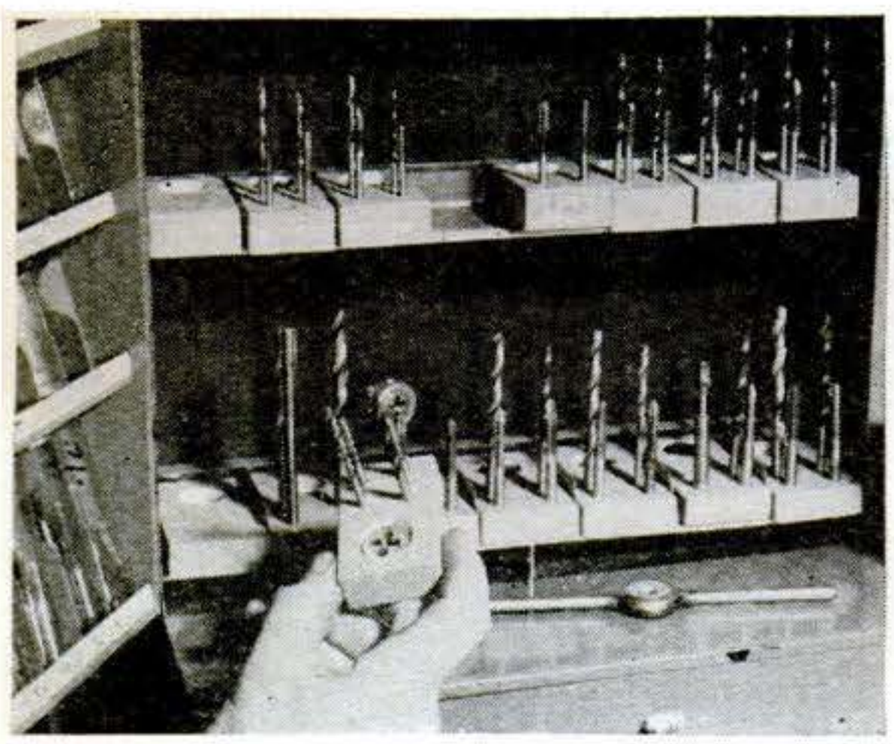
V Blocks Have Extra Uses. That accurately ground V block sitting on the drill table can serve you in more ways than just holding round stock for drilling.

Use it as in Fig. 1 to transfer layout lines from one surface to an adjoining one at 90°.

Or if you wish to measure the depth of a hole or slot accurately, try the setup in Fig. 2. A short length of rod is held in the V block, pushed down into the hole and secured with the V-block clamp. A small piece of ground flat stock of known thickness is placed over the opposite end of the block and the over-all length measured as shown. Subtract the length of the V block plus the thickness of the flat piece of ground stock from the over-all measurement to get the depth of the hole.

The length of shoulders on a shaft can be measured in a similar manner (Fig. 3). A pin with a turned offset head will measure a wide range of shoulder diameters. Because the head is offset, the piece of ground flat stock is unnecessary; the micrometer can be read against the solid part of the V-block end.

The V block in Fig. 4 holds the depth micrometer plumb while a surface gauge is set. This setup can be used to set the cutter bit on a planer or shaper to an accurate height above the table.—*J. R. Lucas, Michigan City, Ind.*



Threading Simplified. As you accumulate taps and dies of various sizes, more and more time is wasted looking up the proper drill numbers for tapping and for clearance holes.

One meticulous craftsman keeps each complete set (drills, tap and die) in an individual block of scrap wood with the thread size stamped on the edge. Selecting the proper block from the shelf puts everything related to that thread size at hand with no chance of a mix-up. It's also a good idea to include both starting and bottoming taps.—*Floyd McGuckin, Ridgewood, N. J.*

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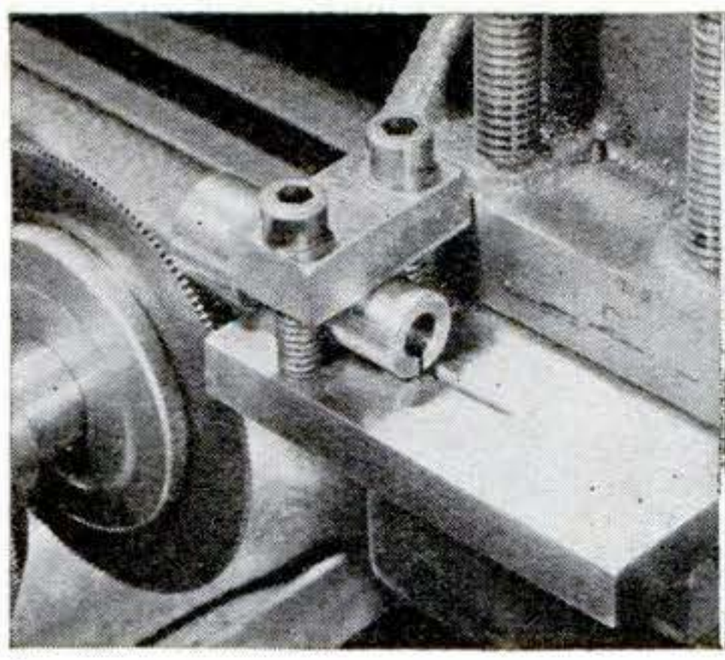
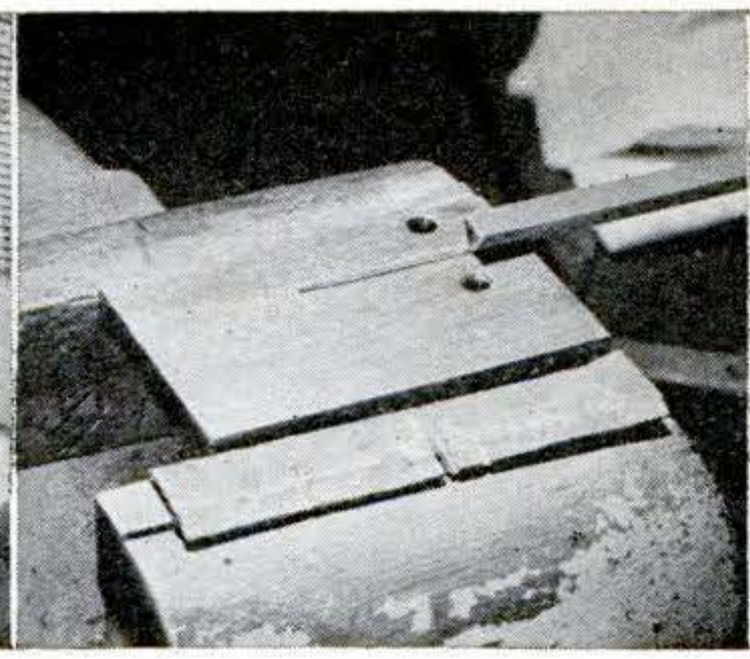
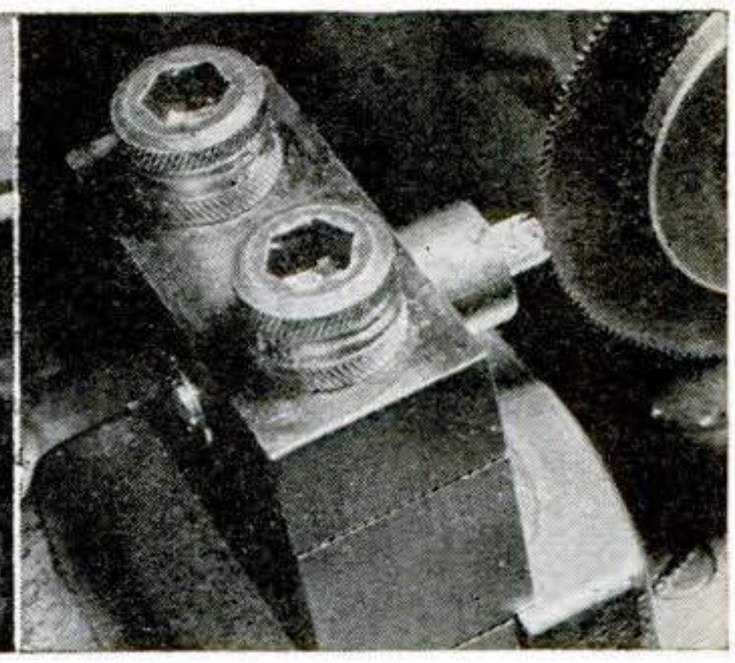
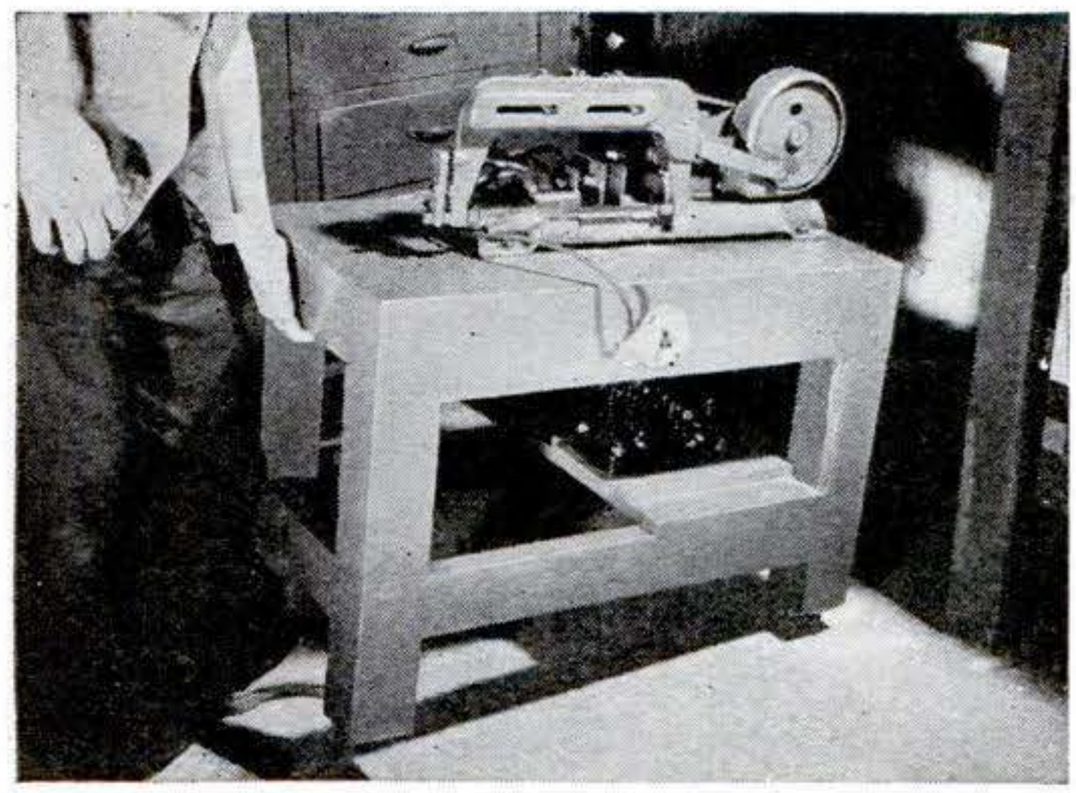




Slotting Homemade Collets Accurately. The toughest operation in making your own collets is cutting the long slots in their sides. This slotting table, made from ⅜″ cold-rolled steel, permits cutting the collet dead true along its entire length. The table itself is slotted and the slot is then filed to a V opening (as in center photo). This acts as a narrow V block, holding the collet in position and guiding the thin slotting saw as it cuts.

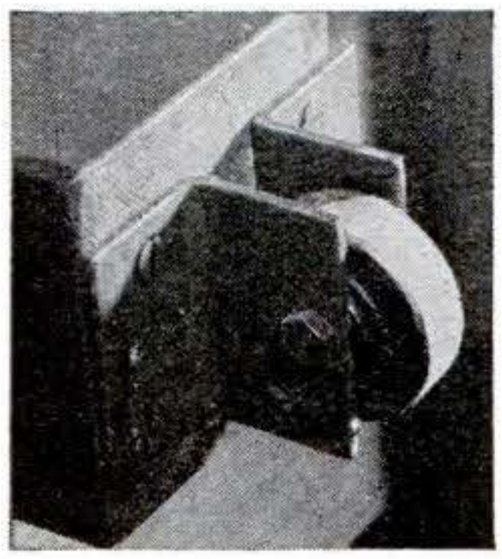
The photo at left above shows a simple collet being slotted with the help of this fixture.

At right is a squeezing block used for compressing simple collets on the work. Here the collet is holding a short shaft while a slot is milled.—*Joseph Tracy, NYC.*

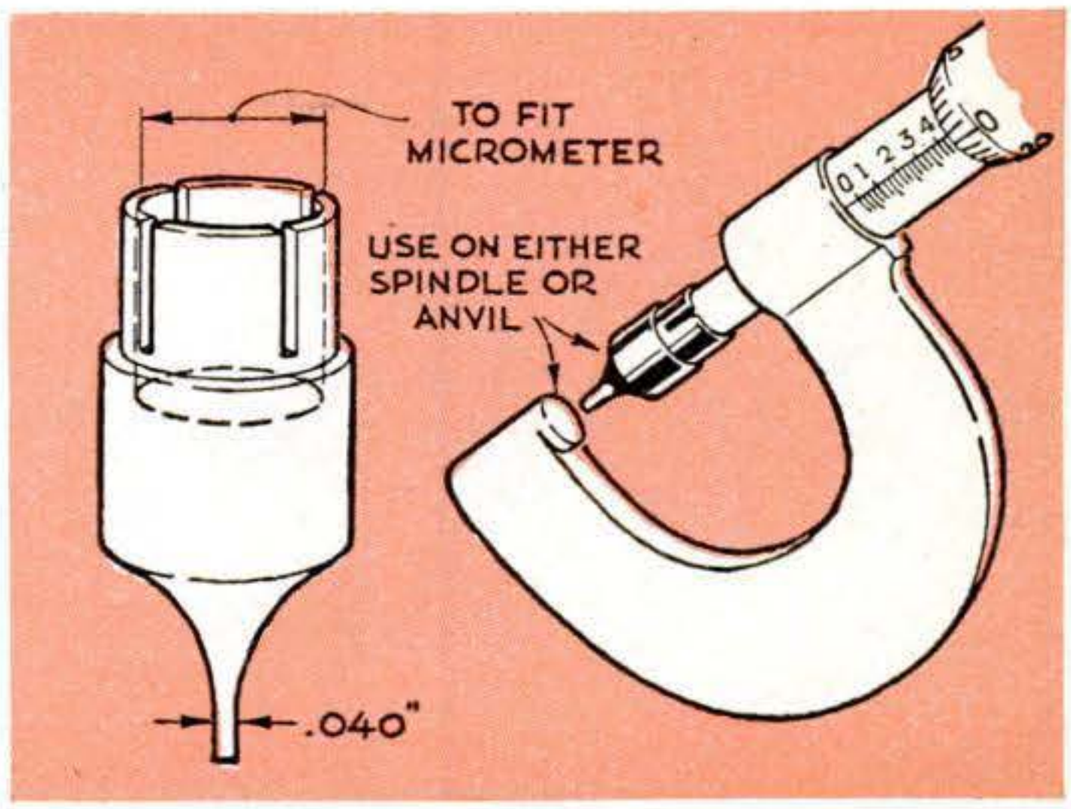


Portable Power-Tool Stand. Where space is limited, one or several power tools can be mounted on roll-away stands like the one above. When not in use, the tools can be rolled under the workbench. Low tools, such as the power hacksaw shown, a jointer or even a small table saw can be mounted and stored out of the way in this manner.

Two legs, usually those on the end that is away from the operator, are fitted with roller-skate wheels held in place by short pieces of angle iron. Bolts are used for axles. To keep the table from creeping when in use, the other two legs do not have wheels. They are made longer so that they will hold the table level.—*Dr. W. W. Lacey Jr., Queens Village, N. Y.*



Keeping Machines Rustfree. It's a good idea to keep some well oiled rags stored safely in a covered coffee can. Then you can quickly wipe the lathe bed or table surfaces of your power tools to keep them bright and free from rust. Make a habit of cleaning and oiling your equipment at regular intervals. Always keep the lid tightly on the rag can to avoid a fire hazard.



Mike Attachment Measures Slots. This pointed tip, quickly snapped on the anvil or spindle of your micrometer, will permit you to measure the depth of slots or keyways. It is turned from a scrap of drill rod and slotted to spring on the mike and stay in place.

To measure with the attachment, close the mike, read it while closed and subtract this reading from that taken from the work. —*A. R. Morgan, Naugatuck, Conn.*

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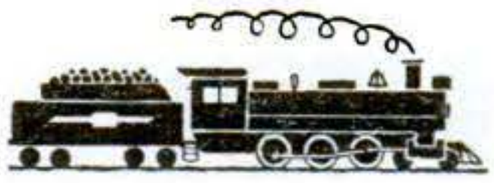
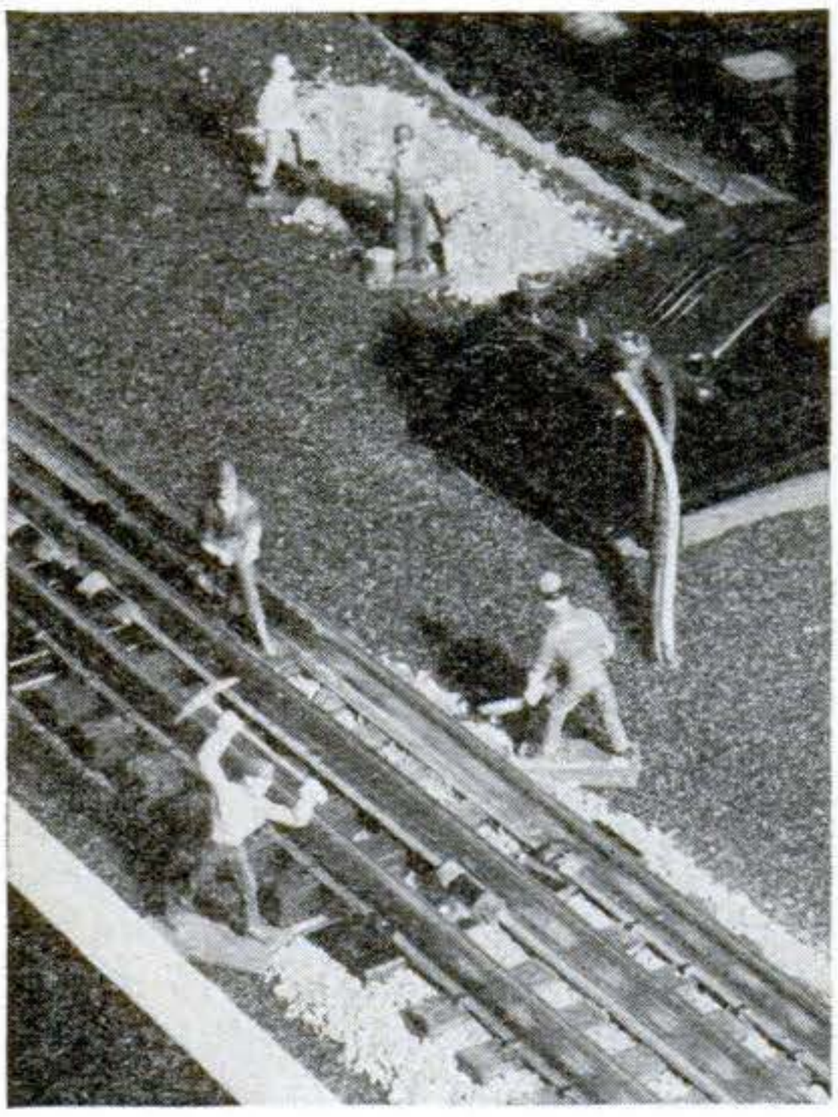
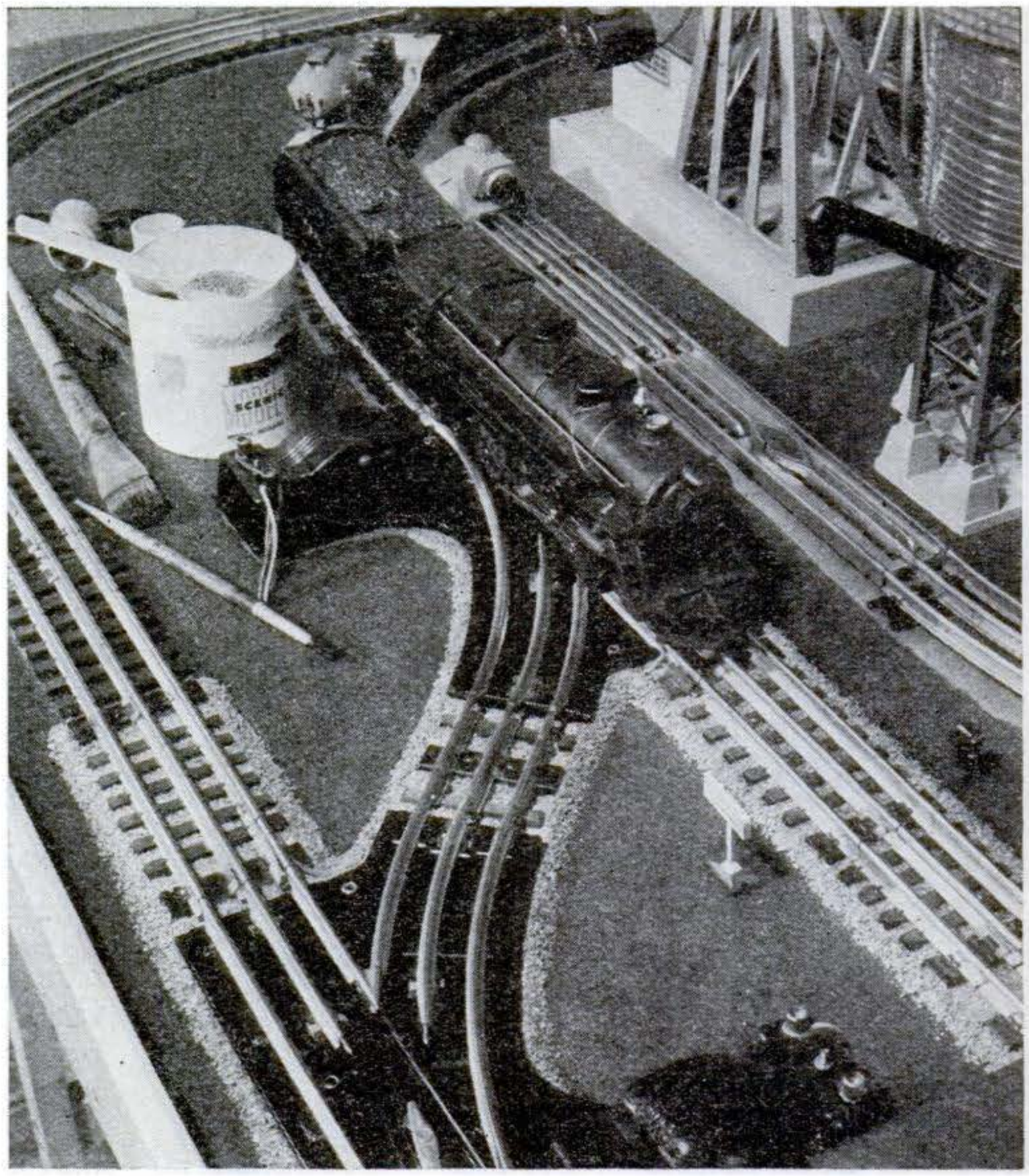
8 Suggestions for Model-Railroad Fans

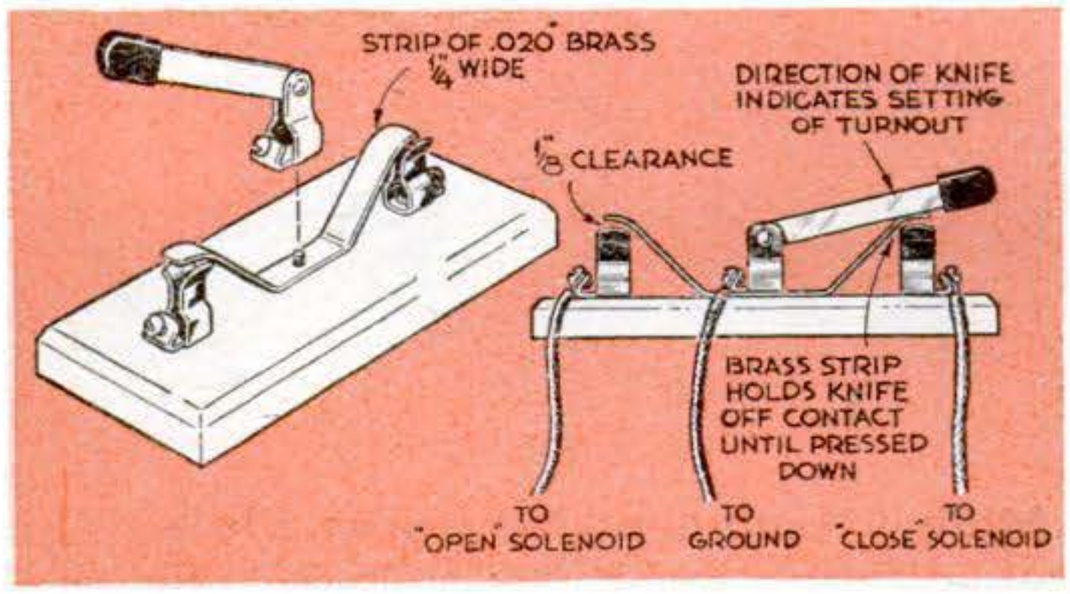




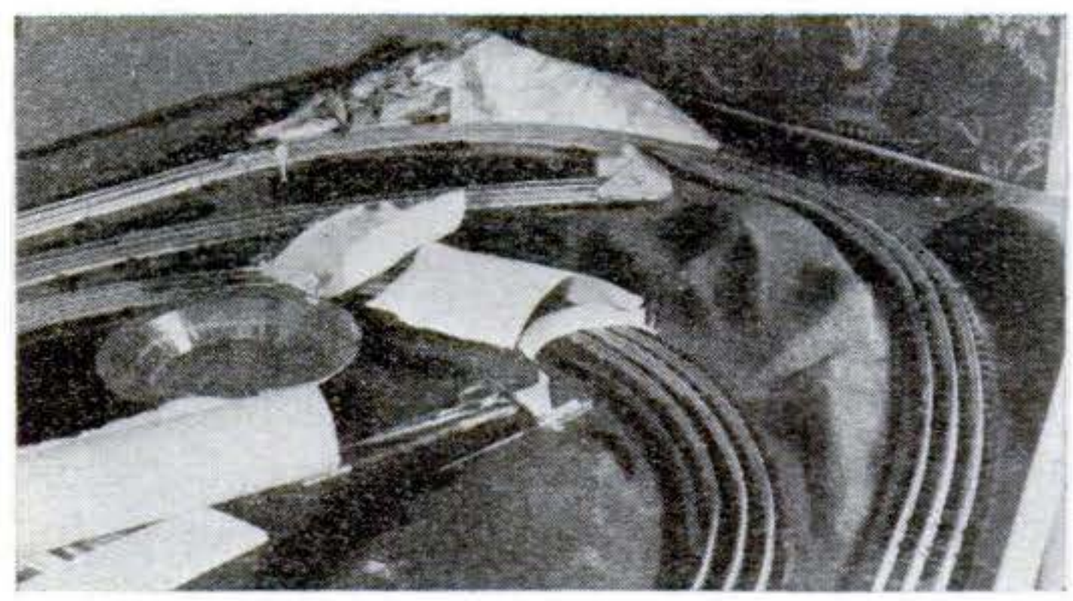


1. True-to-Life Touches. Much can be done to add realism to three-rail track without affecting its construction.

Fill in the spaces between the metal ties with wooden ties stained black. These can be bought in bags of 500 at hobby stores. The finishing touch is the addition of ballast between the ties. Pour this along the track and brush it off the tops of the ties, letting it extend about ½″ beyond the tie ends. Set the track gang at work filling in ballast on a seldom-used siding.



2. Knife Switch Controls Turnouts. Momentary-action toggle switches are sometimes hard to find. A single-pole, double-throw knife switch can be converted to a momentary-contact one by inserting a thin brass strip under the knife pivot. Pushing the knife down forces the brass strip against the contact. When pressure is released, the strip springs up, breaking the contact.



3. Scenery on Small Layouts. A simple cut through rolling country is more realistic on a small layout than a mountain that dominates the whole scene. Colloid-treated cloth (Celastic) applied over a form of crumpled paper can be used for a low embankment along the tracks. This material dries in an hour and can be painted and flocked the same evening (foreground).

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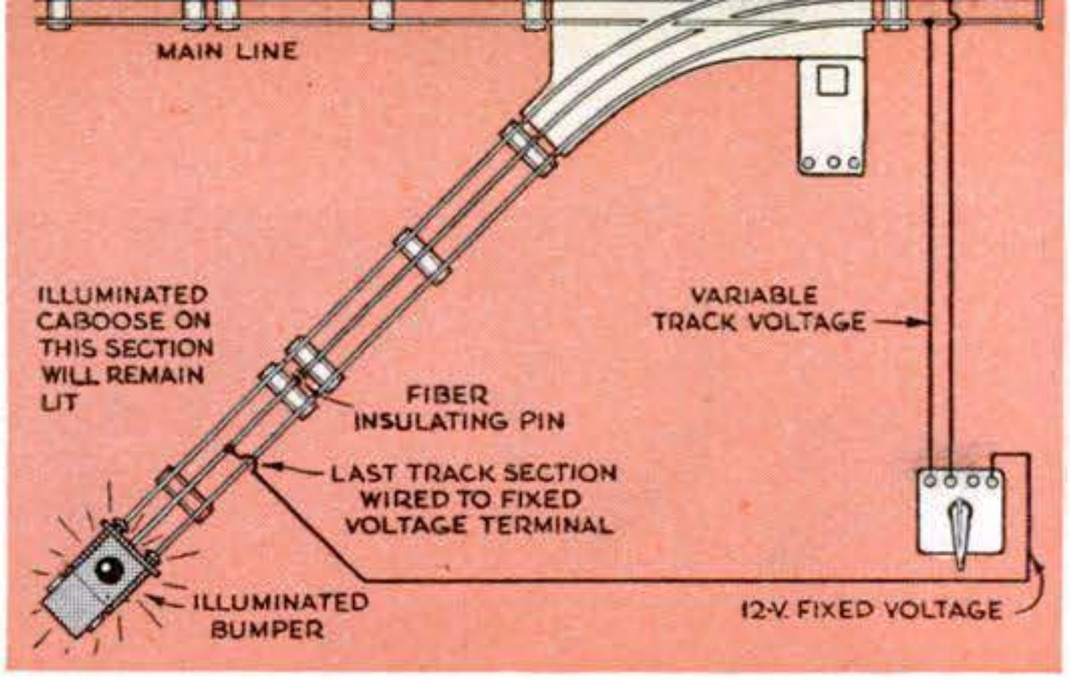
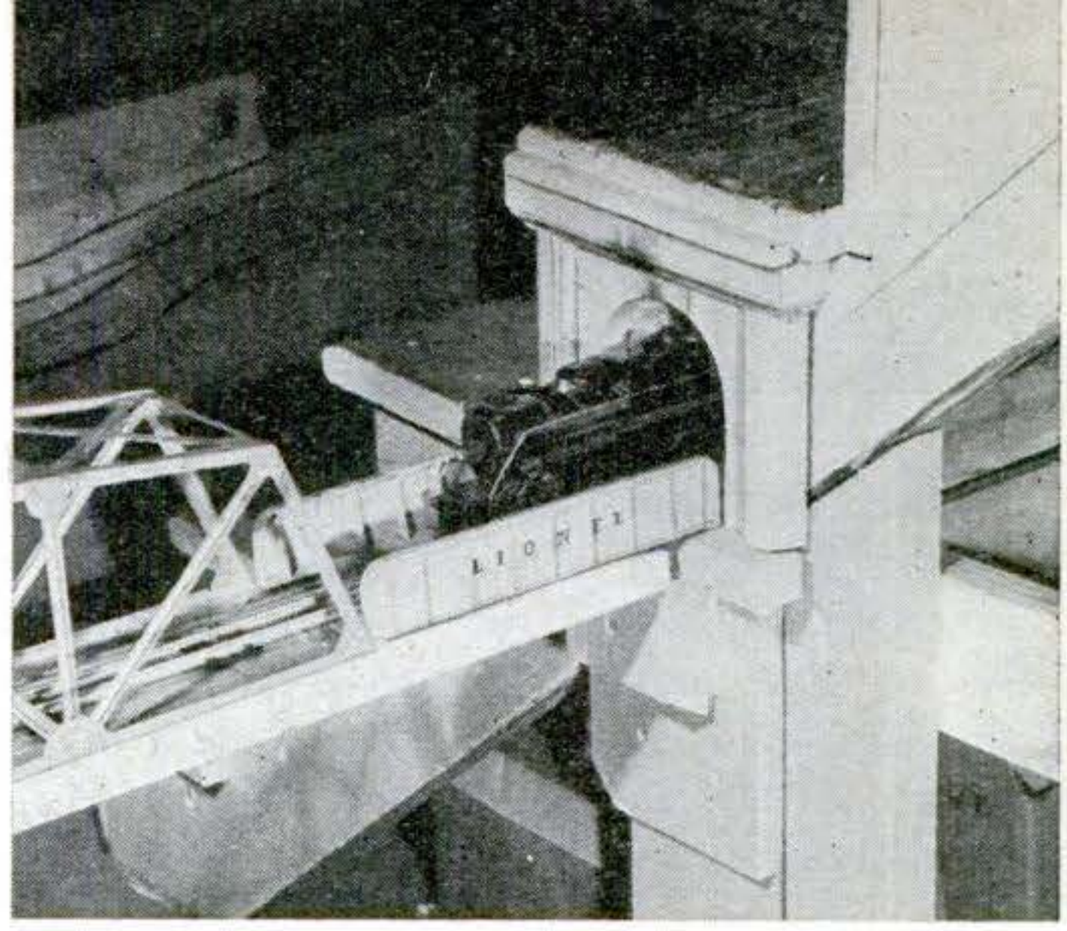


4. Keeping Bumpers Lit. Bumpers, street lights and other illuminated accessories should be wired to the fixed-voltage circuit so that they will stay lighted even when no trains are running. The diagram shows an easy method of keeping the bumper lit along with any illuminated car, such as a caboose, that might be parked on the last track. Trains are generally backed into a siding so the engine won't get on the live track. If you go in headfirst, cut the power and the loco will stop at the bumper by itself.

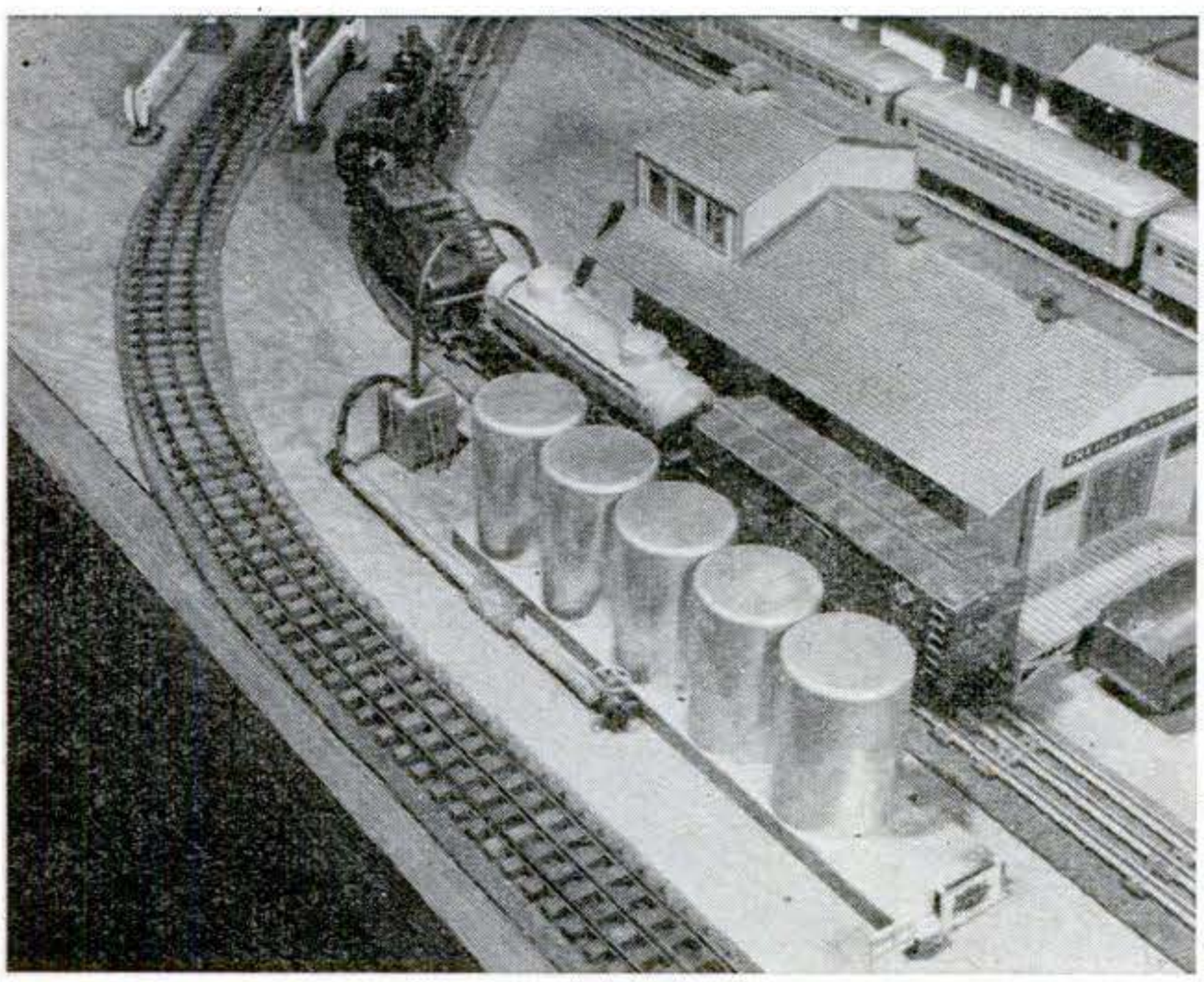
5. S is S and O is O and never the twains shall meet, but S- and O-gauge accessories go well together. In fact, S-gauge stations, coal loaders and electric cranes actually appear more realistic on small O-gauge layouts.



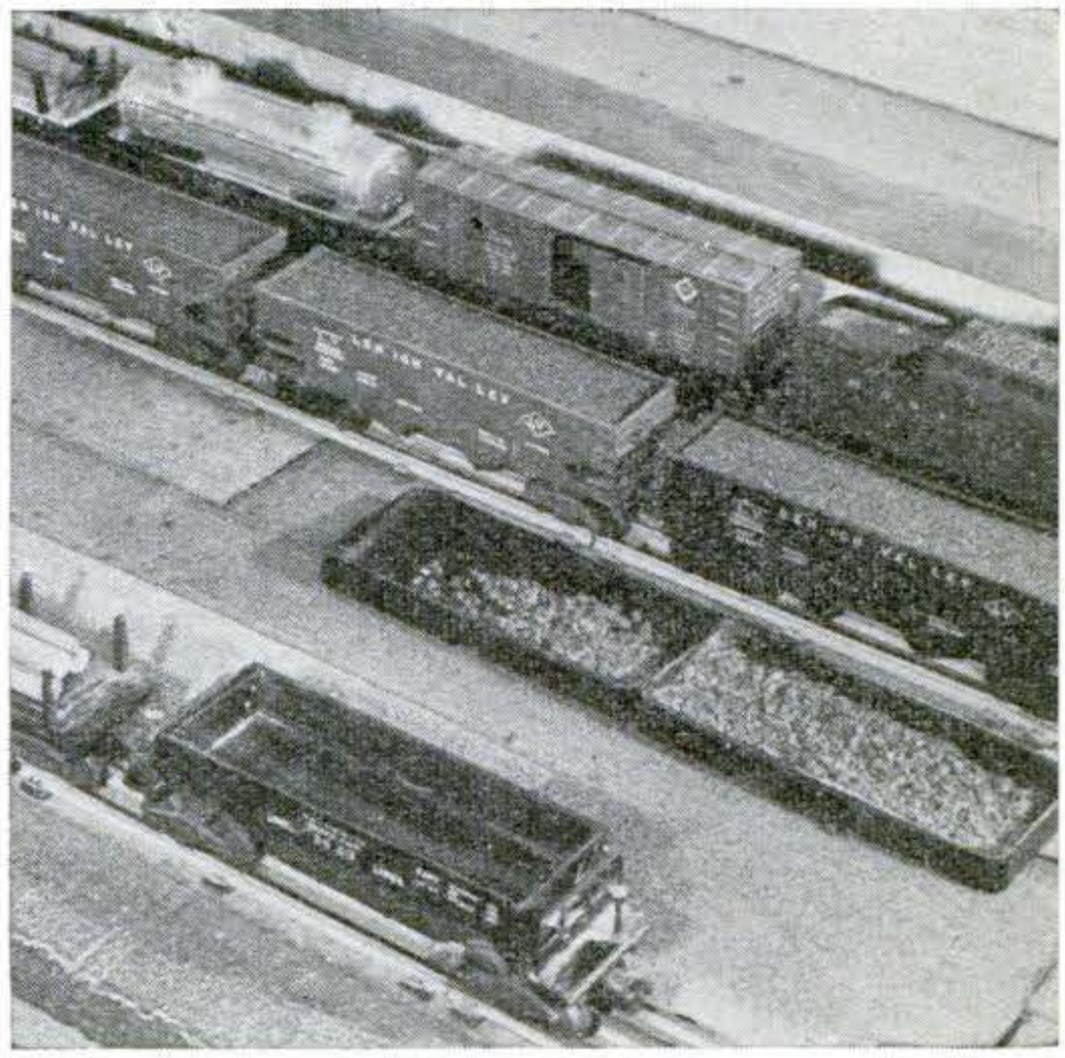
7. Highballing Under the Stairs. Very often the model railroad's right of way is blocked by the cellar stairway. A tunnel under one of the steps will solve the problem and add interest to the layout at the same time.

Cut a portal opening in each stringer and run a shelf across the width of the stairway for the track. Paint the portal to resemble concrete, and smudge the top of each opening with a lighted candle to simulate smoke stain from the locomotives.

Brace each stringer below the cutouts with posts made of two-by-fours to retain the original strength.



6. Radio Shields Make Oil Refinery. Parts salvaged from an old radio chassis can often be used on the train layout. This group of condenser shields mounted on a flat board provides a good reason for running a string of tank cars. A small square shield fitted with lengths of radio spaghetti simulates a pumping station. Handwheels for valves are available at hobby shops.



8. Load Your Hopper Cars. Cut pieces of black asphalt roofing to fit snugly into the open tops of your hopper cars and press each piece up in the center to form a bulge. When forced into the cars, these pieces resemble full loads of coal without adding more than a trifle to the weight of the car. Gray roofing fitted into a gondola car will look like a load of gravel.

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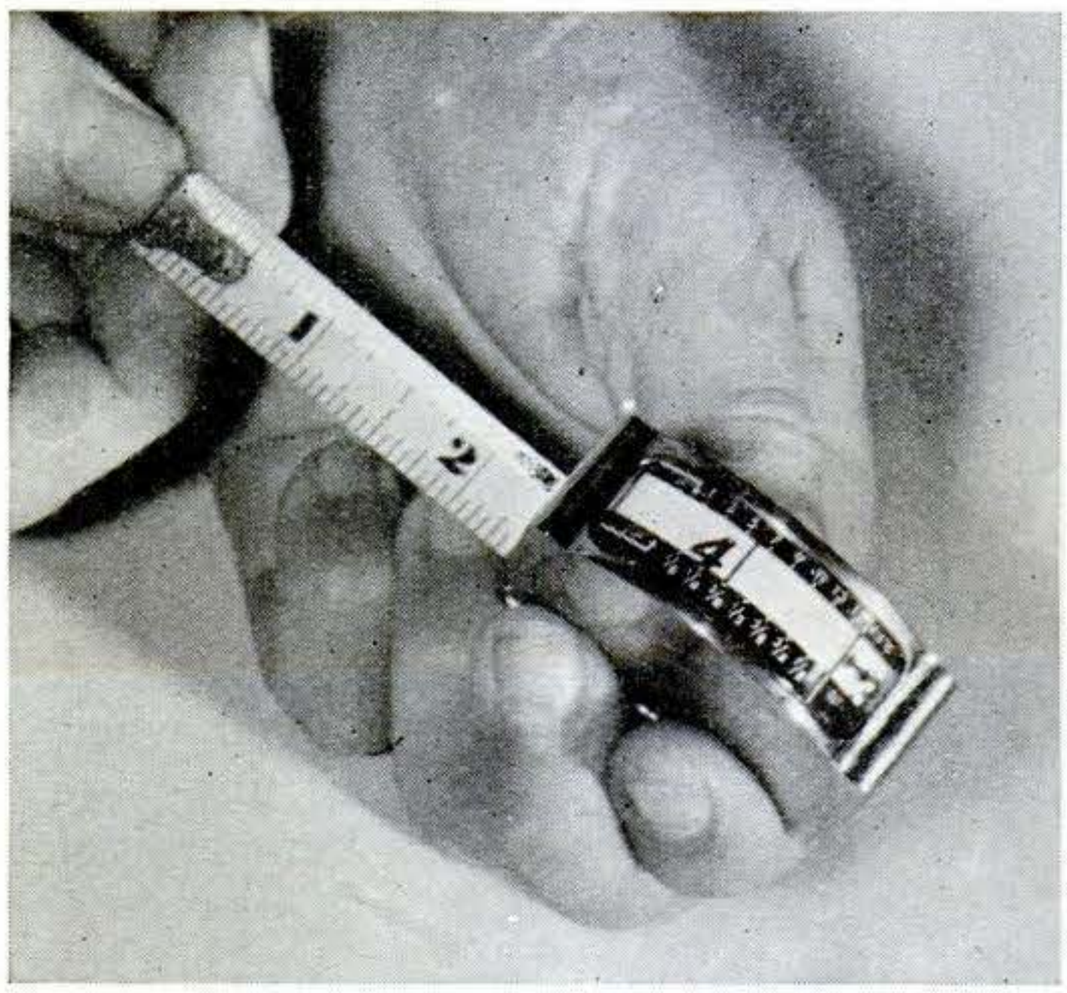
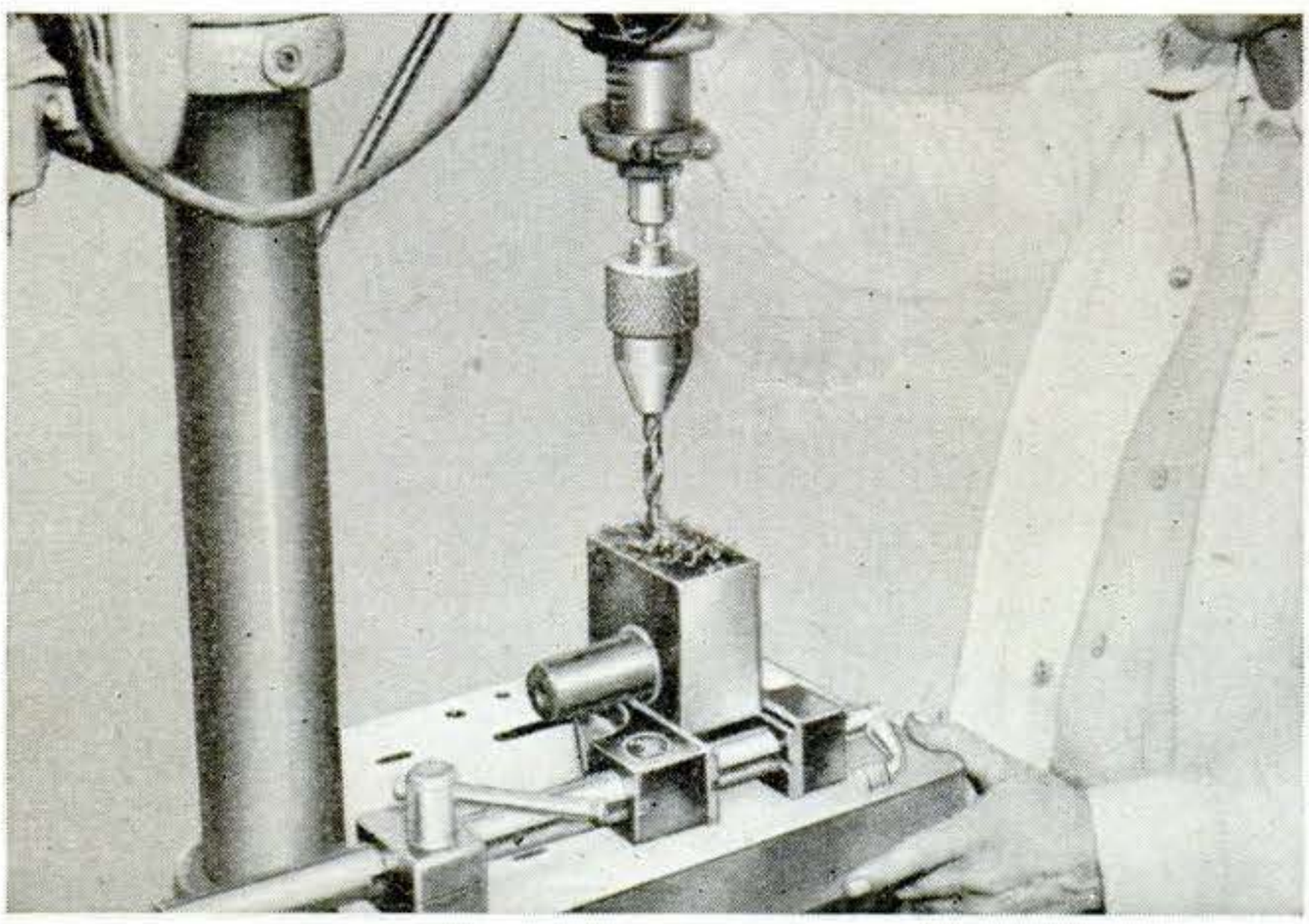
New Tools

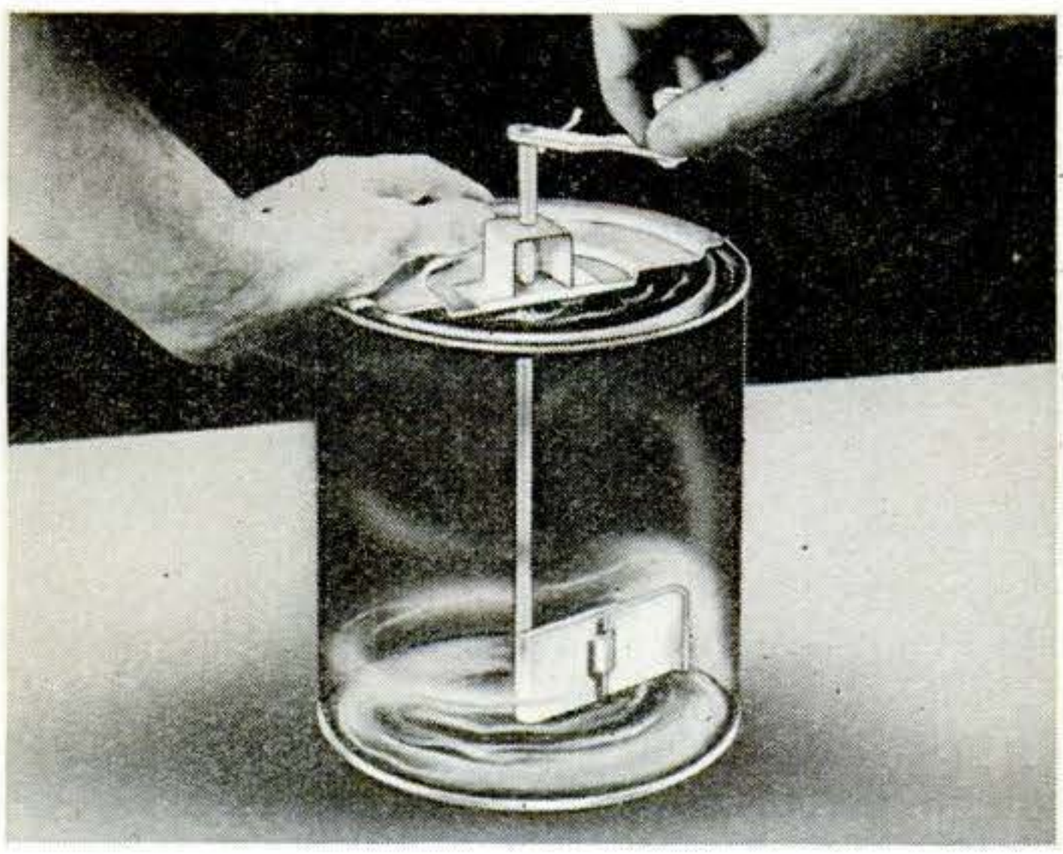


1 Dial on Tape Shows Measurements. This 78″ flexible steel rule has a dial that reads in inches and fractions of an inch to sixteenths. Set into the edge of the case, the dial makes it unnecessary to add the width of the case when taking inside measurements.

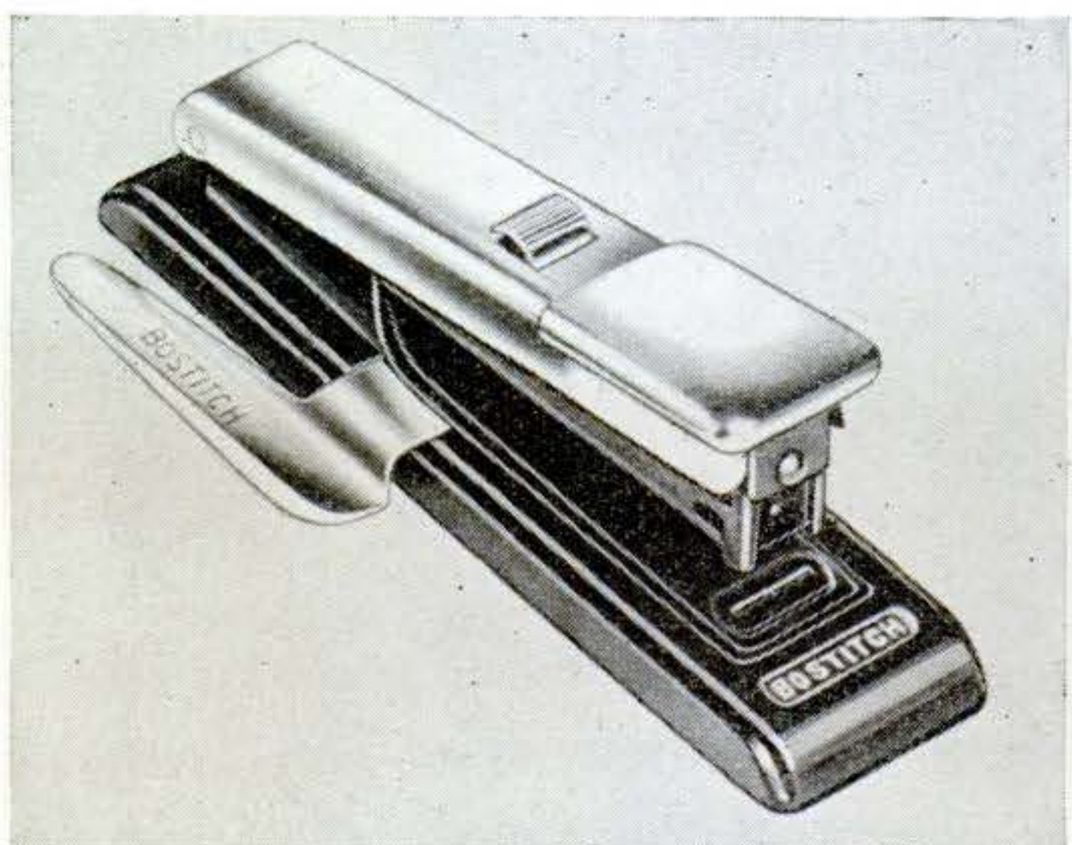
A hardened steel scriber built in the bottom of the case can be used to mark any measurement shown on the dial. Felt pads in the case oil and clean the tape automatically each time it is used.



2 Vise Goes on Drill Press or Bench. Regular, end or angle drilling can be done with a vise that mounts on drill press or workbench. The 8″-capacity jaws have vertical and horizontal V grooves to grip round stock. A quarter-turn of the T handle locks the vise in position on the table, and it swings out of the way when not in use. A similar tool for bandsaws, with 10″ capacity, is made by the same company. It lets you cut to close tolerances without touching the material.



3 Paint Mixer Fits in Can. Only half the top of the can is covered by the mixer above so that the device can be left in place while you paint. Whenever stirring is needed, you just turn the crank. The mixer is available in two sizes to fit pint, quart and gallon cans.



4 Stapler Handles Four Jobs. A tacker, stapling plier, desk stapler and staple remover are combined in one tool. A window in one side of the machine lets you see when the staple supply is low. The stapler can fasten together at least 32 sheets of ordinary bond paper.

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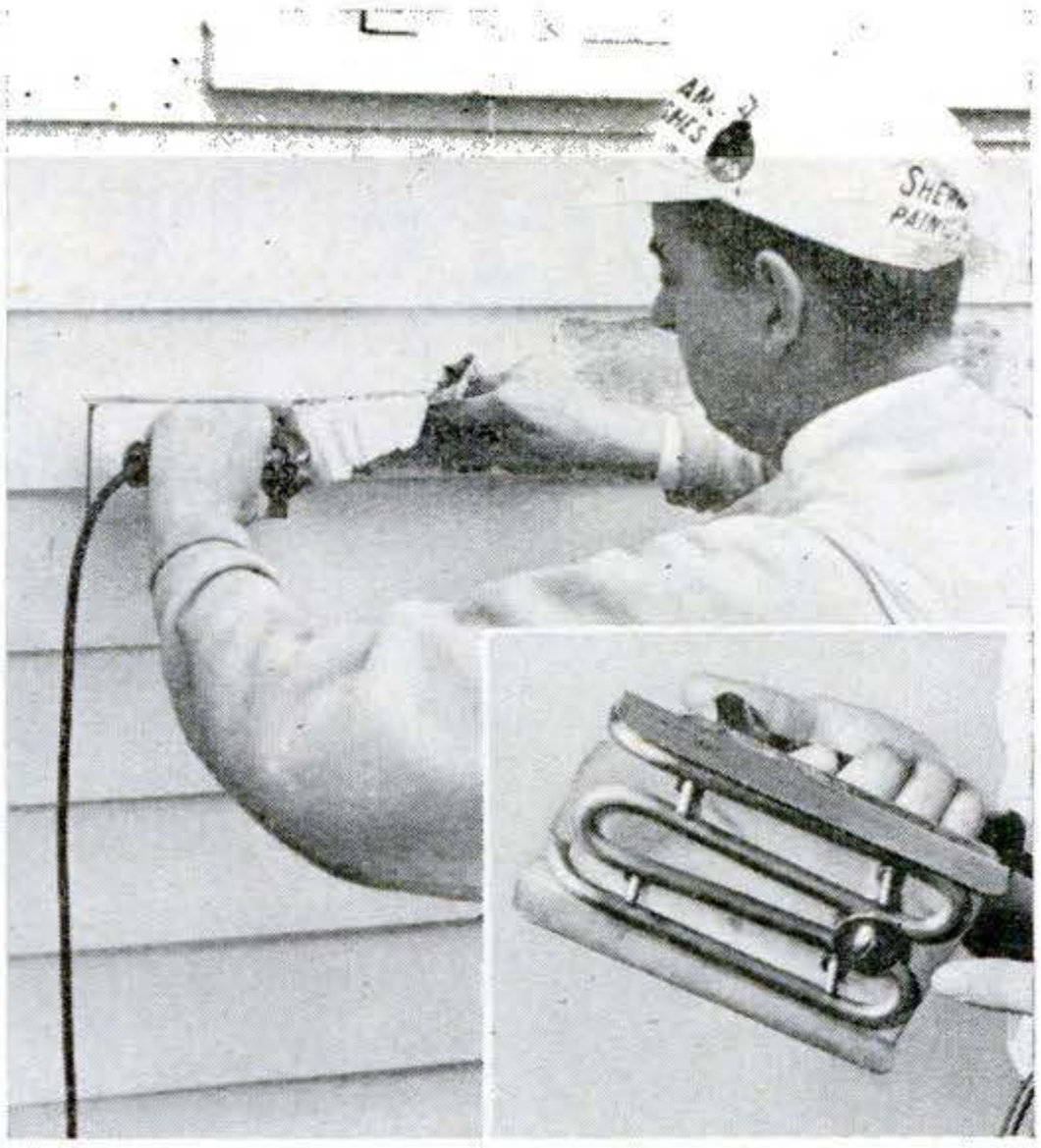
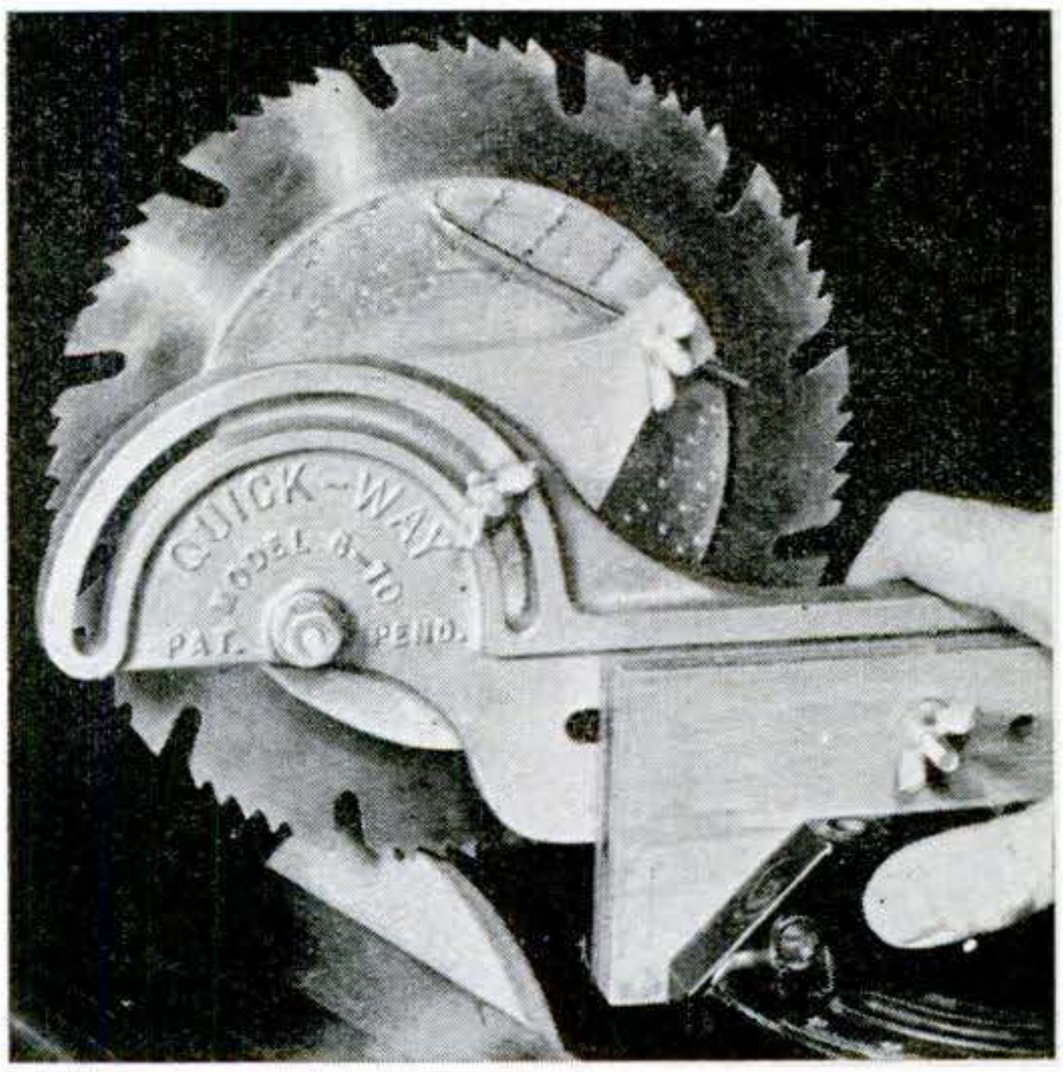
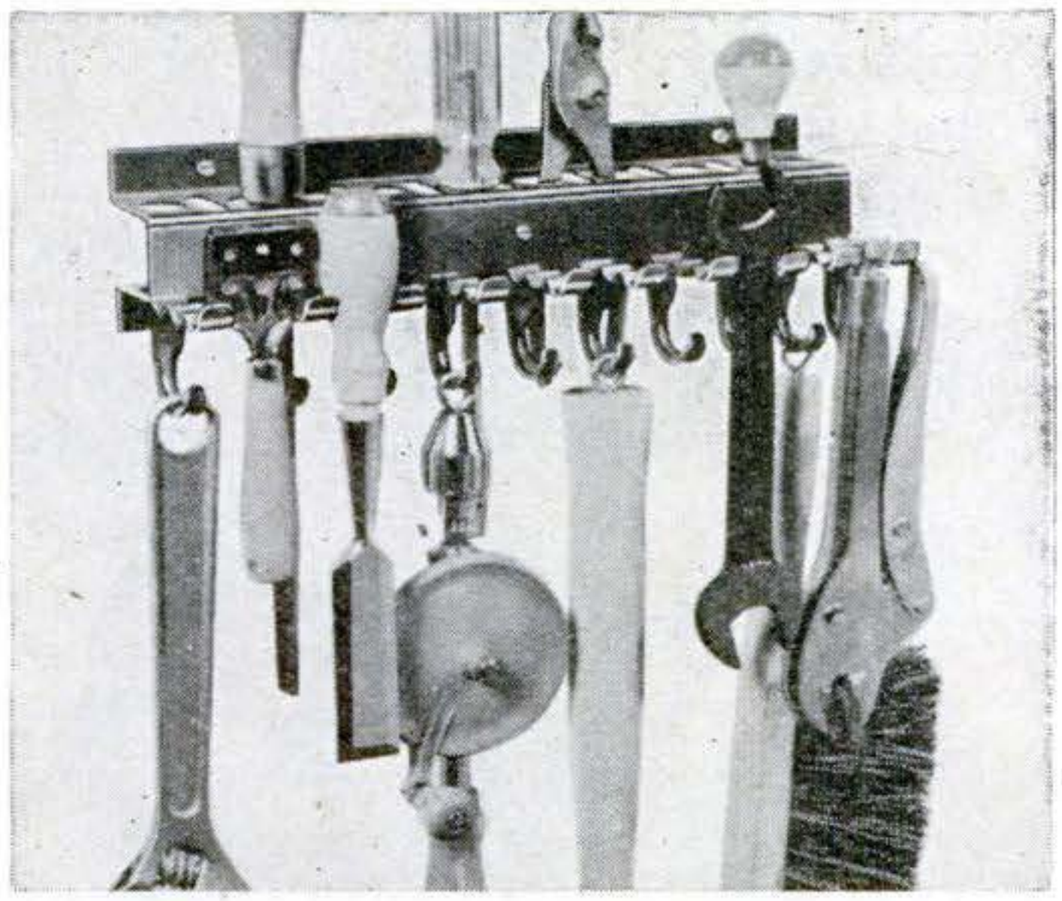


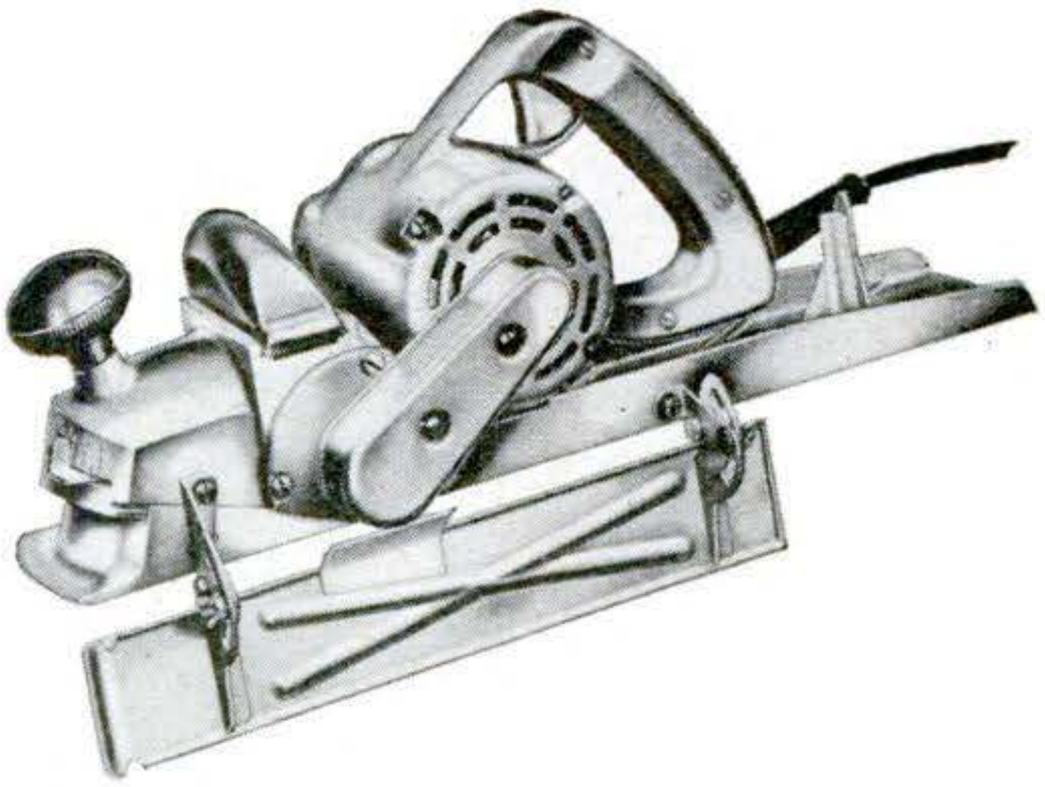
5 Radiant Heat Removes Paint. When this tool is slid along a painted surface, heat from an electrical unit (inset) softens the paint so it can be removed with a putty knife. Skids keep the heating unit a safe distance from the paint and two metal reflectors keep the plastic handle cool. The remover weighs 2½ lb., is 6½″ long and is rated at 1,000 watts.



6 Index Plate Guides Saw Sharpener. Accurate bevels can be ground on the teeth of circular-saw blades with a jig that bolts to the saw miter gauge. After counting the number of teeth in the blade, you lock the index plate at the position indicated by a chart that comes with the tool. Combination, cross-cut, rip, miter, planer and PTI blades can be sharpened with the tool. A grinding wheel is included with the sharpener.



7 Tool Rack Holds Three Rows. The three parts of the holder above can be mounted together as shown above or they can be mounted separately to give you three tool holders in different parts of your shop. The rack has a zinc-coated finish. Self-tapping, flathead screws are furnished.



8 Portable Electric Plane. With a 3″ width of cut and a ⅛″ depth of cut, this plane has a cut-depth control lever graduated to 1/64″. Power is transmitted from the motor by a sprocket-type belt, turning the cutter head at 13,500 r.p.m. Bevel adjustments are made by loosening and tightening two wing nuts. The tool weighs 10½ lb. It comes with a steel carrying case.

Further information on these tools may be obtained from: 1. Kipco Industries, 1910 Corunna Ave., Owosso, Mich.; 2. Float-Lock Corp., 511 Fifth Ave., NYC 17; 3. Marien Metal Products Co., 1220 E. Nine Mile Road, Hazel Park, Mich.; 4. Bostitch, Westerly, R.I.; 5. General Electric Co., Schenectady 5, N.Y.; 6. Quick-Way Saw Co., 13 Riverside, Corning, N.Y.; 7. Patterson Bros., 15 Park Row, NYC 7; 8. Skil Corp., 5033 Elston Ave., Chicago 30.

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Picture it in full color... and see the difference!

Now it's so easy with a fine Kodak miniature camera. COLOR makes the difference. It's the only way to catch the warmth of an autumn field, the flash of hunter red, the majesty of blue sky. And the wonderful part is that taking color pictures requires no more effort on your part than a black-and-white shot.

Today it's so easy to enjoy color pictures with reasonably priced miniature cameras and viewing equipment. You see two camera examples on this page. And on the facing page are camera accessories and projection equipment. Be sure to inspect these at your Kodak dealer's. He will supply you with everything in the way of color.

Thrifty color "miniature"—The Kodak Pony 828 Camera makes superb color slides on Kodachrome Film; sharp black-and-white negatives; gorgeous Kodacolor snapshots. Kodak Anaston *f*/4.5 Lens (Lumenized). Flash shutter with speeds to 1/200. Takes 8-exposure rolls. $31.15. The "Pony 135," for 20- or 36-exposure 35mm. film, has automatic film-stop and exposure counter. $35.75. Kodak Flasholder for both cameras, $8.25.

Precision range-finder "miniature"—The Kodak Signet 35 Camera boasts the world-famous Kodak Ektar Lens (*f*/3.5). With this fine lens you can do salon-quality color work . . . get sharp, brilliant color slides, for projection or for color prints, with Kodachrome 135 Film; also sparkling black-and-whites. The "Signet" has coupled range finder; feather-touch shutter release bar; speeds up to 1/300; built-in flash synchronization. $92.50. Flasholder, $8.25.

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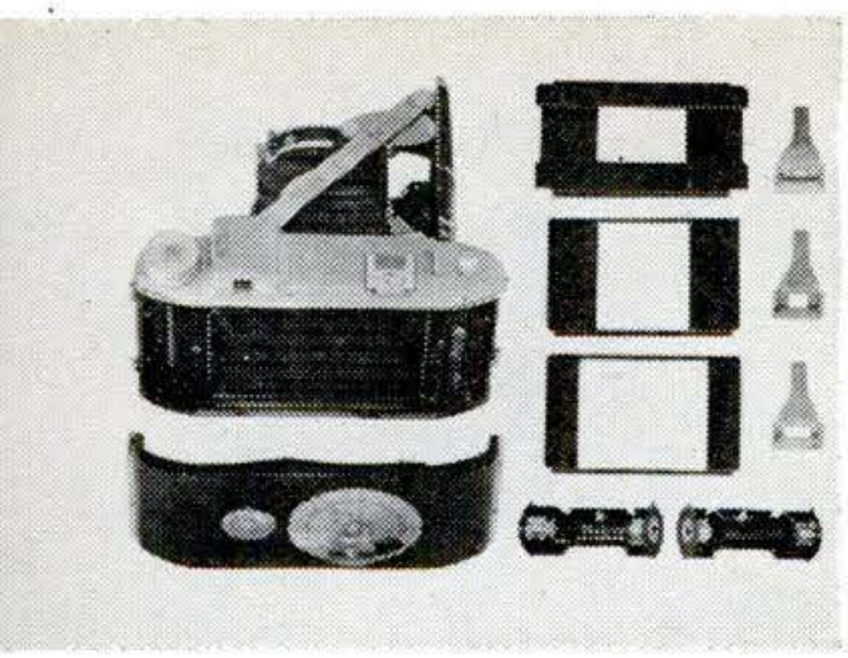
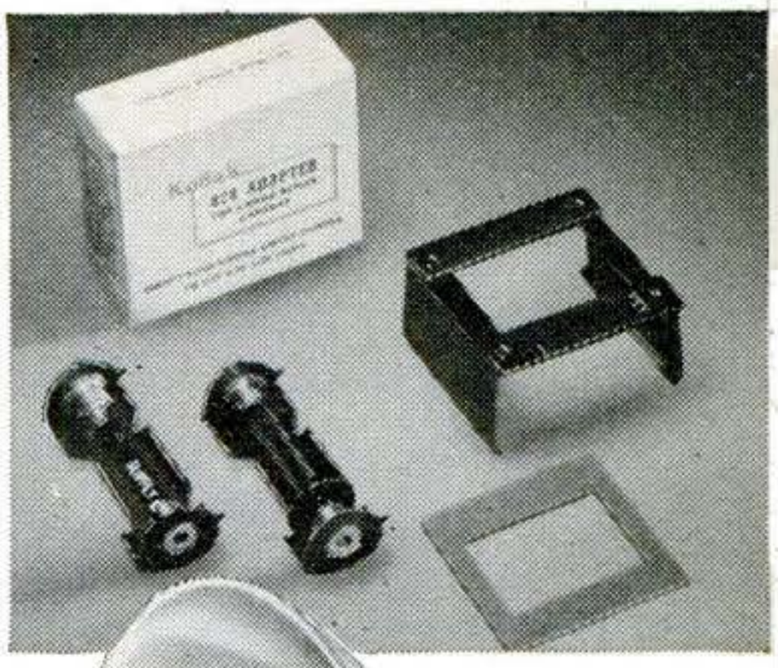


Inexpensive adapter kits permit use of Kodachrome Film with Kodak Tourist and Reflex Cameras—Kodak Tourist Adapter Kit, $13.25 (*left*), for deluxe model "Tourists," and the Kodak 828 Adapter for Kodak Reflex cameras, $4.59 (*right*), let you take pictures in full color on Kodachrome or Kodacolor 828 Film. "Tourist" kit also permits economical half and square pictures on all Kodak 620 films.

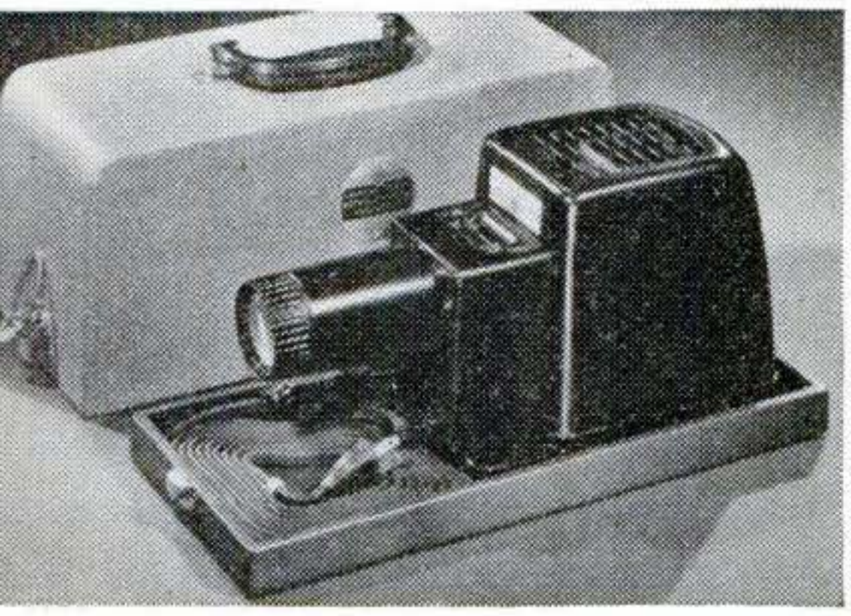


Get in the picture yourself with a Kodak Auto-Release (for any camera equipped with cable release). Delays shutter action. $3.86.

New, dependable battery-condenser flash system — The revolutionary new Kodak Ektalux Flasholder gives positive flash performance. Secret: condensers store power from 22.5-volt photoflash batteries until needed . . . fire lamp in a single surge far more powerful than the force of the usual battery. With Standard Bracket, $29.75; with Press Bracket, $33.85; with Bracket for Polaroid Land Camera, $30.60.

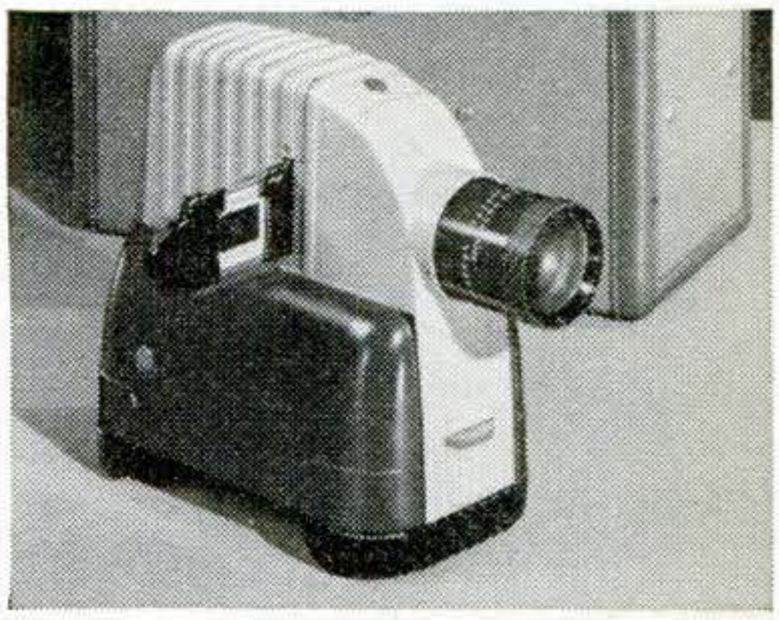
For deluxe small-group showings— The Kodaslide Table Viewer, Model A (*left*), combines projector, screen, slide changer in one unit. Takes 75 cardboard or 30 double glass slides. $97.50. Carrying case, $27.50.

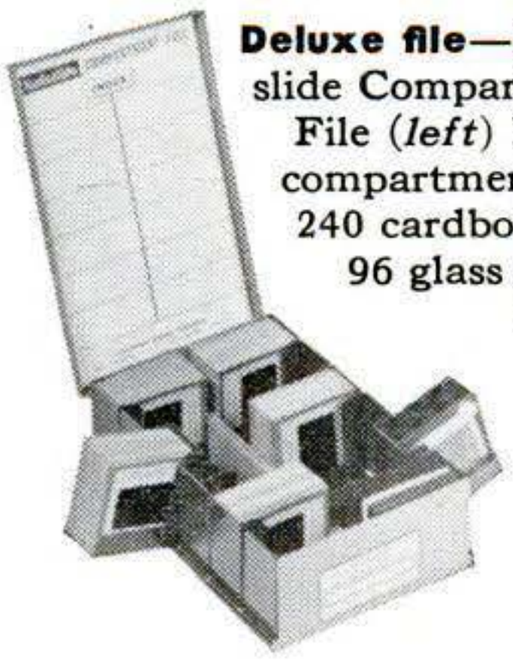
Inexpensive table viewer—Kodaslide Table Viewer, 4X (*right*), enlarges slides more than four times on built-in screen. Images are bright and clear even in a lighted room. $49.50. Carrying case, $15.50.



Budget-priced slide projector— Kodaslide Merit Projector (*left*) features new jar-proof slide feeding. Brilliant 5-inch *f*/3.5 Lumenized lens; built-in elevation device; cool operation. $26.10. Carrying case, $9.50.

King of them all — 1000-watt Kodaslide Projector, Master Model (*right*), delivers screen images of unprecedented brilliance. Ideal for large-group showings. Choice of 4 lenses. From $169.00. Carrying case, $50.





Deluxe file—Kodaslide Compartment File (*left*) has 12 compartments for 240 cardboard or 96 glass slides. $3.94.

For mounting transparencies in glass—Kodak Slide Kit contains everything you need—glass for covering transparencies, masks, binding tape, and tabs for 50 slides. $3.63.

Inexpensive protection for slides—Kodaslide File Box (*right*) keeps them organized. Holds 150 cardboard or 53 glass slides. $1.57.

See your Kodak dealer for all your photo needs

Prices subject to change without notice and include Federal Tax where applicable

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.

Kodak
TRADE-MARK

[*Continued from page 150*]

which hundreds of water tubes pour accumulated steam for re-distribution. But how this six-foot-long forging could be lengthened to 20 feet, and its walls thinned down from their present 12-inch thickness, I wasn't exactly sure.

The answer came quickly. Another little group of aluminum-cloaked men was standing on two raised platforms at the far end of the shop. Between the platforms a round steel bar projected from a horizontal cylinder, its blunt head aligned as true as a gun sight with the center of a heavy steel ring some 40 feet in front of it. Below and on either side of the ring were rollers forming a track.

Above us the crane growled by with the header forging dangling from its claws. The cables played out and the aluminum-cloaked steelworkers probed the load from left to right with long-handled hooks until it rested squarely on the rollers. Now the heavy bar, or mandrel, began to drive the hollow forging through the ring of tough steel. Almost silently the doughnut-shaped die peeled off a layer of scale. The ingot itself was narrowing out under 1,200 tons of mandrel pressure.

New Process Handles Any Size

It takes a number of draws to bring one of these units around to size. Each draw, of course, means a change to a smaller die, and while the rings can be changed in a matter of minutes, there is still the problem of keeping the forging hot.

"Right now," Tom said, "we haul it back to that furnace at the other end of the shop, but we are building a second furnace down here. But the real highlight of this new header-forming process is the fact that we can turn out a single unit of any size with no loss in plant efficiency."

There is another type of work for which this shop is especially suited. That is the bending of the heavy plate used in 2,300-pound-pressure steam drums.

Pressures like that call for shaping sheets six inches thick. They also call for a lot of heavy welding—50,000 pounds of steel rods for a single boiler installation. Anything that reduces the number of individual welds makes a better product and saves time.

The new vertical press does just that. Before I left Barberton I watched the heaviest plate ever rolled—a 43-ton sheet 37 feet long, 10 feet wide and half a foot thick—enter that press as flat as a mason's trowel. Exactly 21 minutes later it came out again, curled into half a steam drum shell. During those 21 minutes the red-hot plate was moved nine times. The four hooklike manipulators which swung the plate from one bending operation to the next responded to the touch of a finger.

X Rays in the Boiler Factory

There are other new tools at Barberton. Pipe benders which compress and thicken the walls of a tube in the exact area where it will be bowed, to offset the drawing action which narrows the outer perimeter of the bend. Hydraulic presses which convert flat steel disks into convex drumheads. A small electric-arc furnace which sizzles and splutters like a witch's caldron as it melts 16,000-pound heats of steel. There is even a two-million-volt X-ray machine, housed in a concrete building which must be entered by a steel door lined with a three-foot blanket of cement. That gadget can detect a faulty weld as quickly as you'd find a worm hole in an apple.

All of these tools add up to a new kind of boiler factory—one whose efficiency is no longer measured in decibels of sound. Science has taken the place of the old riveting hammer to produce a product which ranks among the world's largest single-purpose machines. END

Always a First Time

AN OZARK hermit died recently when he wandered out of the woods and saw an automobile for the first time. He didn't see it soon enough.
—*Milwaukee Road Magazine*

Copyrighted material

WORLD'S MOST EXCLUSIVE CLUB ADDS 12 NEW MEMBERS!

TROY RUTTMAN

JIM RATHMANN

SAM HANKS

DUANE CARTER

ART CROSS

JIMMY BRYAN

JIMMY REECE

CLIFF GRIFFITH

JACK McGRATH

JIM RIGSBY

JOE JAMES

BILL SCHINDLER

Tops in professional prestige among racing drivers is membership in the Champion 100-Mile-An-Hour Club.

Since 1935 just 62 have qualified by completing, *without relief*, the full 500 miles in the famed Indianapolis Memorial Day Classic at an average speed of 100 miles per hour or better.

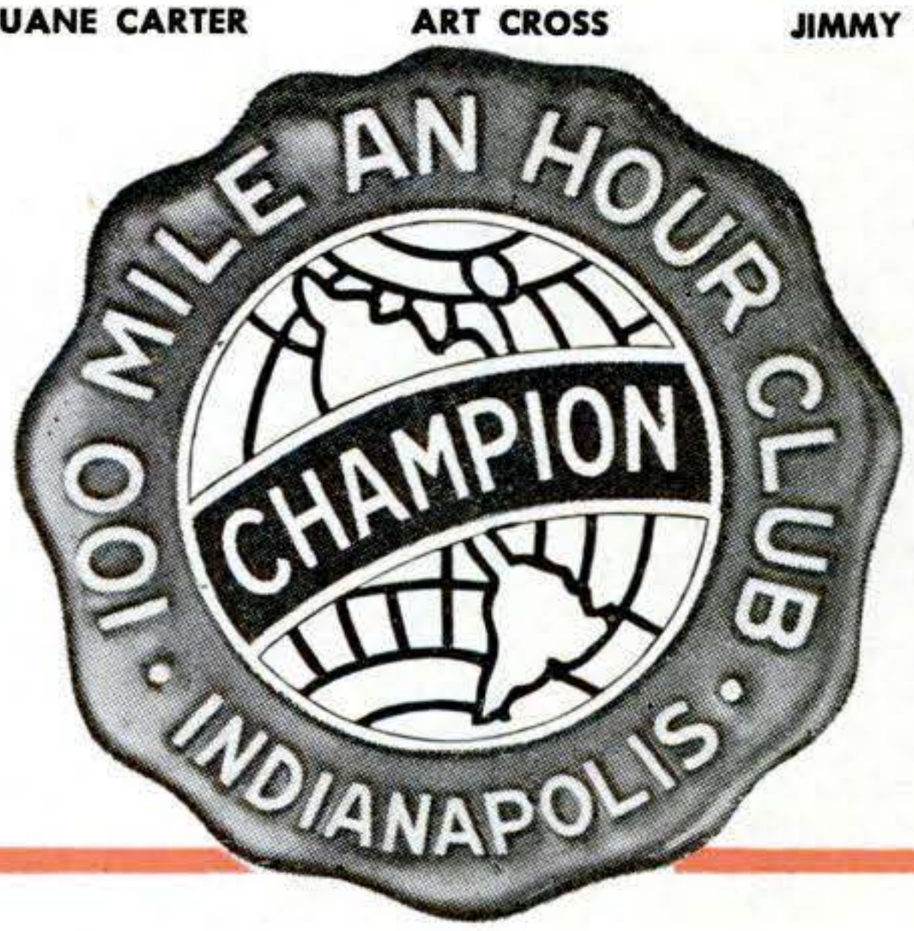
Champion Spark Plugs were the confident choice of 56 of the 62 club members. This almost unanimous preference by the racing elite points an emphatic fact for every performance-minded motorist: for championship performance in *your* car, you need Champion Spark Plugs.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

FOLLOW THE EXPERTS—CHOOSE THE SPARK PLUGS

CHAMPIONS

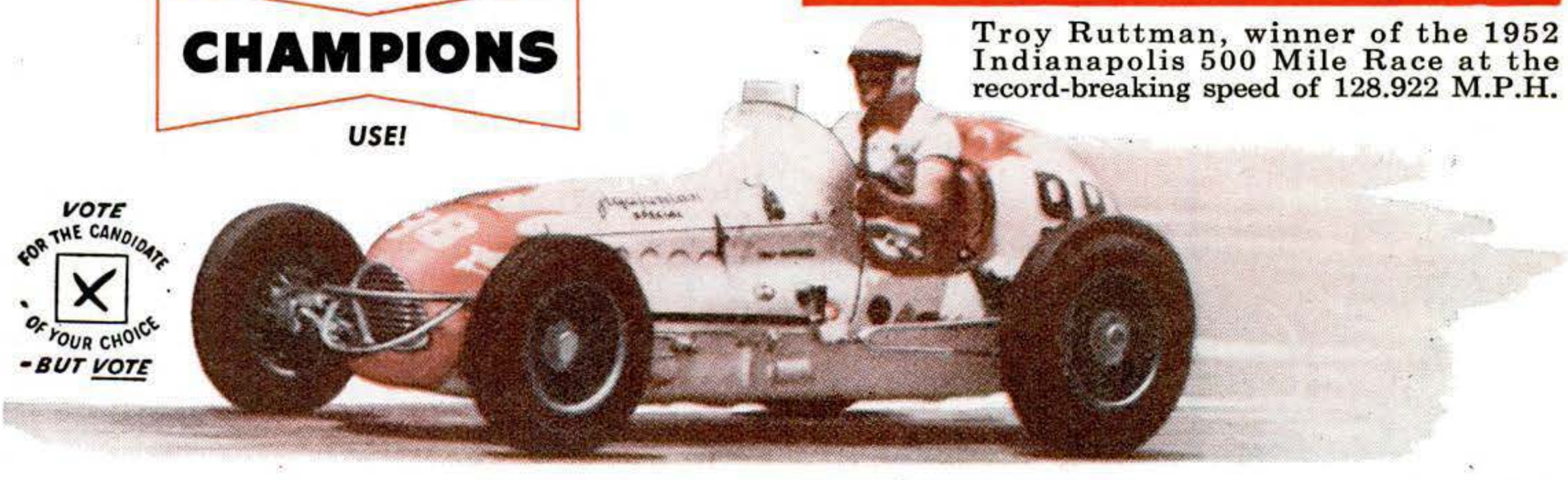
USE!



CLUB ROSTER

Emil Andres
Billy Arnold
Bob Ball
Henry Banks
George Barringer
Cliff Bergere
Walt Brown
Jimmy Bryan
Bob Carey
Duane Carter
Joie Chitwood
Hal Cole
George Connor
Art Cross
Bill Cummings
Lewis Durant
Dave Evans
Myron Fohr
Fred Frame
Chet Gardner
Cliff Griffith
Sam Hanks
Mack Hellings
Ralph Hepburn
Bill Holland
Ted Horn
Jimmy Jackson
Joe James
Andy Linden
Doc MacKenzie
Johnny Mantz
Rex Mays
Jack McGrath
Lou Meyer
Zeke Meyer
Chet Miller
Lou Moore
Duke Nalon
Mike Nazaruk
Johnny Parsons
Kelly Petillo
Ray Pixley
Jim Rathmann
Jimmy Reece
Jim Rigsby
Floyd Roberts
George Robson
Mauri Rose
Paul Russo
Troy Ruttman
Bill Schindler
Wilbur Shaw
Russ Snowberger
Jimmy Snyder
Babe Stapp
Stubby Stubblefield
Joel Thorne
Louis Tomei
Luigi Villoresi
Lee Wallard
Frank Wearne
Howdy Wilcox

Troy Ruttman, winner of the 1952 Indianapolis 500 Mile Race at the record-breaking speed of 128.922 M.P.H.



VOTE FOR THE CANDIDATE OF YOUR CHOICE - BUT VOTE

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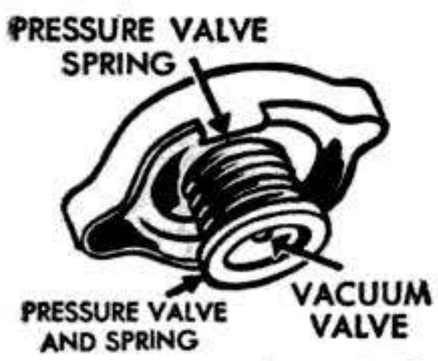
Care and Feeding of Engines

BY S. P. CORP

PRESSURE COOLING

To increase the efficiency of the modern car cooling system, a pressure-type radiator cap is often used, making it a closed system. Each four pounds of pressure will increase the efficiency of the cooling system ten per cent. Each pound of pressure also raises the boiling point three degrees.

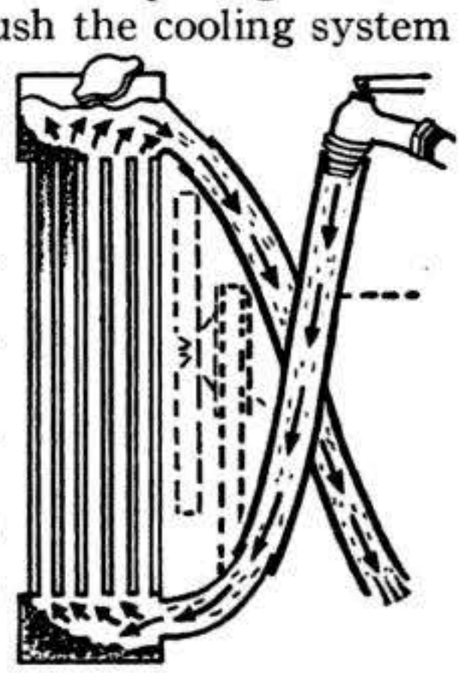


Keep these points in mind: (1) Various pressures are used, from four to nine pounds. Never use any cap but the one made for your radiator. Too much pressure will cause radiator damage. (2) Be sure the overflow pipe is always open; a restricted pipe will damage radiator or hose. Keep hose free of leaks. (3) Do not be alarmed if your instrument panel shows a high temperature; it means greater engine efficiency.

Above all, be sure to know the pressure used on your car, and be sure you are using the radiator cap which is made for your system!

CLEANING COOLING SYSTEMS

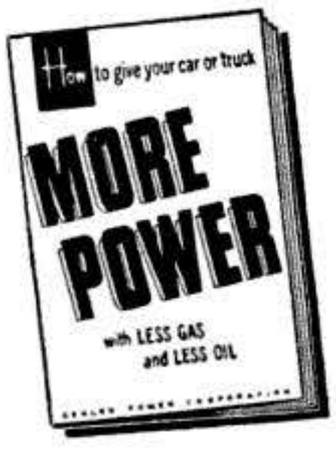
If your engine overheats, inspect the cooling system to make sure that water passages are not clogged. *First,* use a reputable solvent to clear passages in the cylinder block. Then reverse-flush the cooling system by removing hose connections and installing long hose as shown. *Do not remove radiator cap.*



Then connect a water hose to the lower radiator connection and turn on pressure so water flows from top hose. Flush until water leaving the radiator is clear.

For efficient operation of car heaters, the heater core may be flushed in the same manner.

WRITE FOR HELPFUL FREE BOOKLET



You'll find useful help on car care in the new free booklet, "MORE POWER, Less Gas, Less Oil," which is fully illustrated. It tells you all about Sealed Power KromeX Ring Sets, which fight heat, friction, corrosion, and abrasion in late-model cars and trucks, to give you double mileage. Write for your copy now! Sealed Power Corporation, Dept. H-11, Muskegon, Mich.

How Toy Inventors Sell Their Ideas

[*Continued from page 153*]

tossed in the corner if it doesn't stimulate a child's dramatic interest.

A toy designer must also choose his materials shrewdly. Plastic dies cost so much that they can seldom be used for limited-market toys—those which will retail for more than $10. But plastics are excellent materials for inexpensive toys that can be mass-produced. Steel, aluminum, copper and several other metals are still scarce. If you need strategic materials, you had better redesign your toy or forget it.

Many an excellent toy idea has been laid aside because it would cost too much to produce. You have to have something exceptional to succeed with a toy that retails for more than five dollars. The mark-up on toys is nearly 100 percent of the manufacturer's selling price. And the manufacturer needs enough to cover his overhead and investment. So any toy that calls for more than two dollars' worth of labor and material has two strikes against it.

Package Must Attract Parents

The toys that succeed, moreover, are those that are packaged to attract parents. If a toy is too large to fit on a display counter, or too heavy to mail easily, or too complicated to explain, no manufacturer will touch it.

Doctor-nurse kits have been on the market a long time. But the American Metal Specialties Corp. spent a year perfecting the packaging of its Kidd-e-Doctor and Kidd-e-Nurse kits. They tried to duplicate a doctor's leather satchel. The boys' bag is "authentic" black and the girls' kit is red. Each of these sets has 63 different items, including Johnson & Johnson bandages, adhesive tapes, cotton, Band-Aid strips and play bottles of Mercurochrome. American Metal produced one of the most beautifully designed packages ever seen—and sold nearly a million sets in six months.

If instructions for using a toy are necessary, they should be short, simple

[Continued on page 248]

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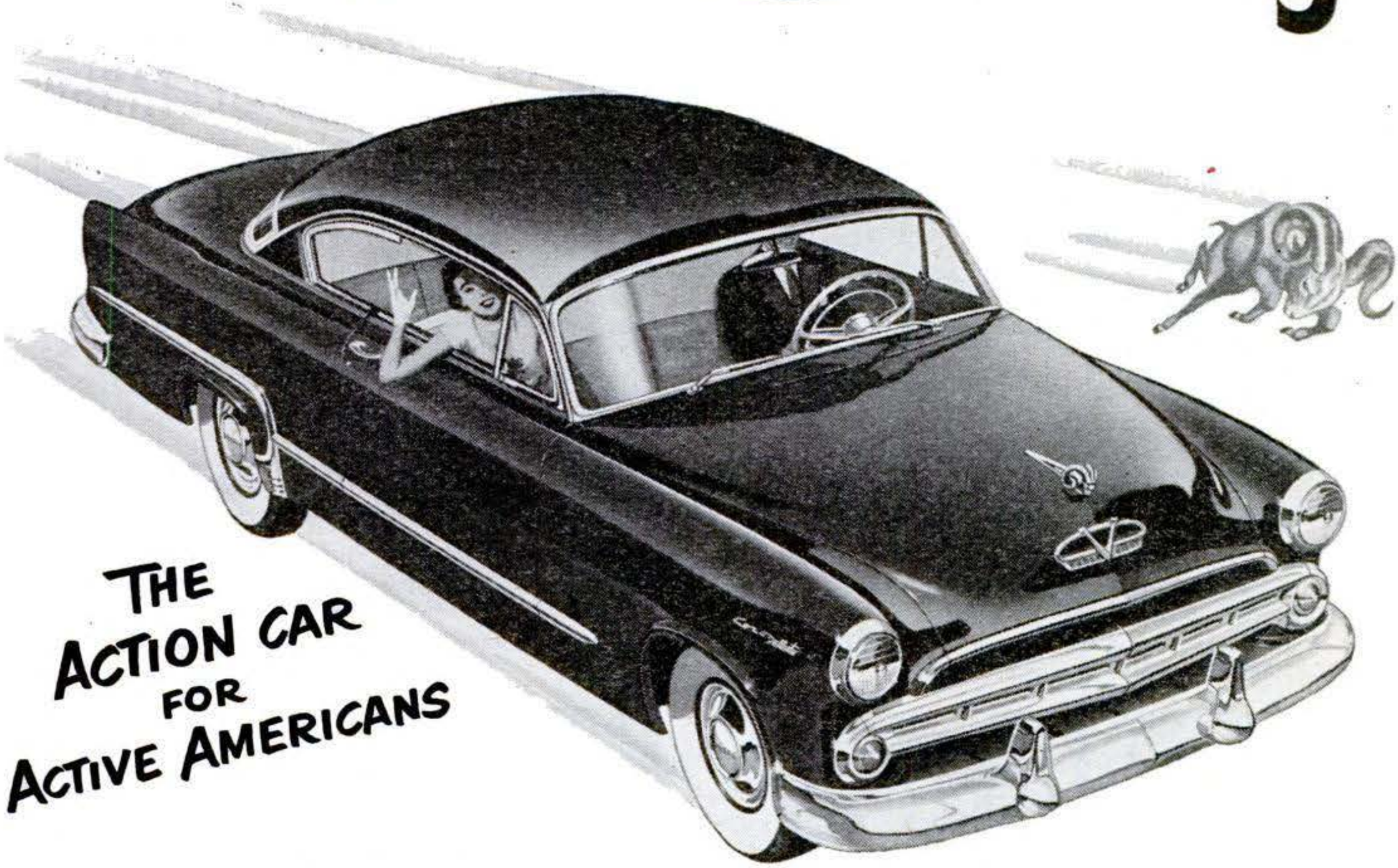
Announcing the

New—*All New* '53 Dodge



You'll Want to Get Your Hands On This

Power Packed Beauty

Here is a new kind of car, designed to meet the needs of active, on-the-go Americans more completely, more thoroughly, than ever before!

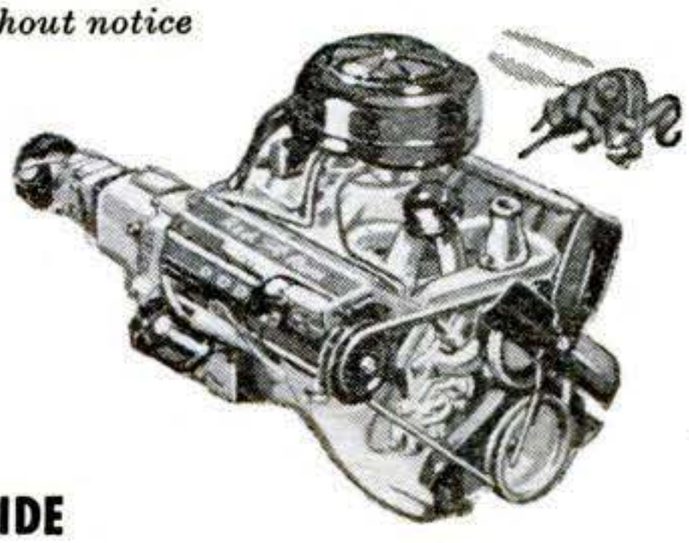
It's powered for action, with a thrilling reserve of acceleration that lets you drive with greater confidence and safety. *It's styled for action,* with lower, livelier, lovelier lines and spacious Travel-Lounge interiors. *It's engineered for action,* with a new road-hugging ride, new steering ease, new Gyro-Torque Drive for nimble change of pace.

You'll want to see and drive America's Thrilling Action Car . . . The new '53 Dodge.

Specifications and Equipment subject to change without notice

Sensational New
140 Horsepower RED RAM V-8 ENGINE!

Packs more power punch per cubic inch displacement. Delivers full 140-h.p. on "regular" gas. New high-efficiency design means *more* fuel energy goes into power, less is wasted on heat and friction.



VISIT YOUR DODGE DEALER AND THRILL TO A "ROAD TEST" RIDE

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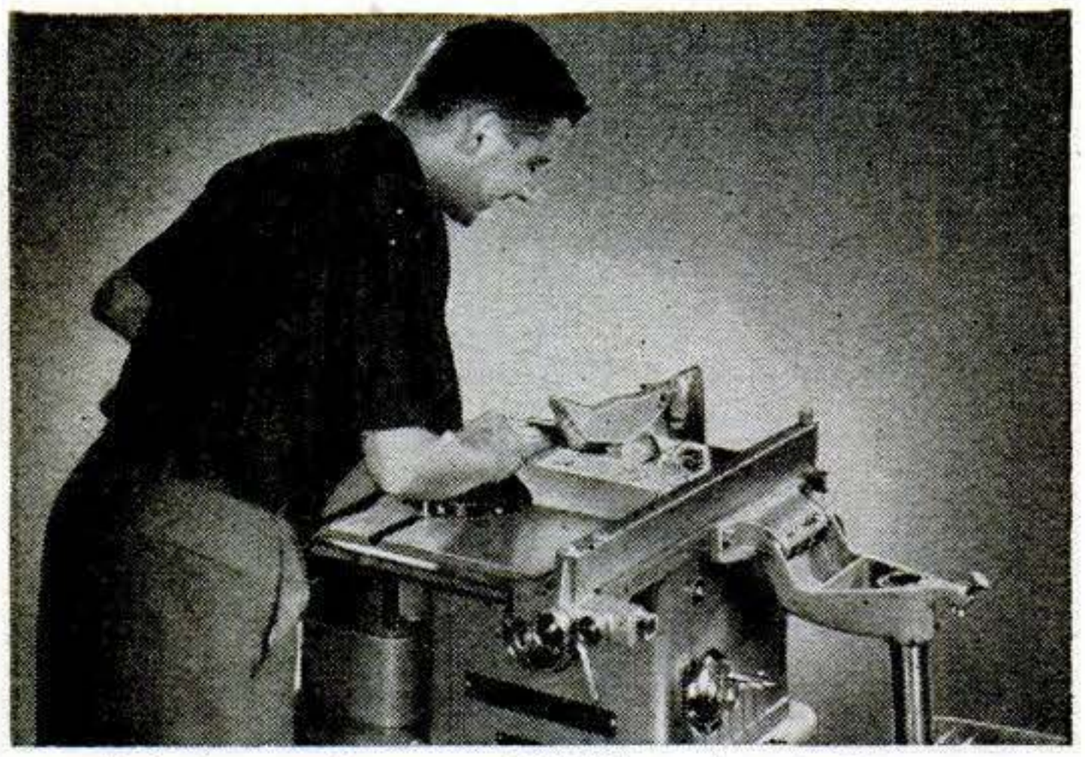
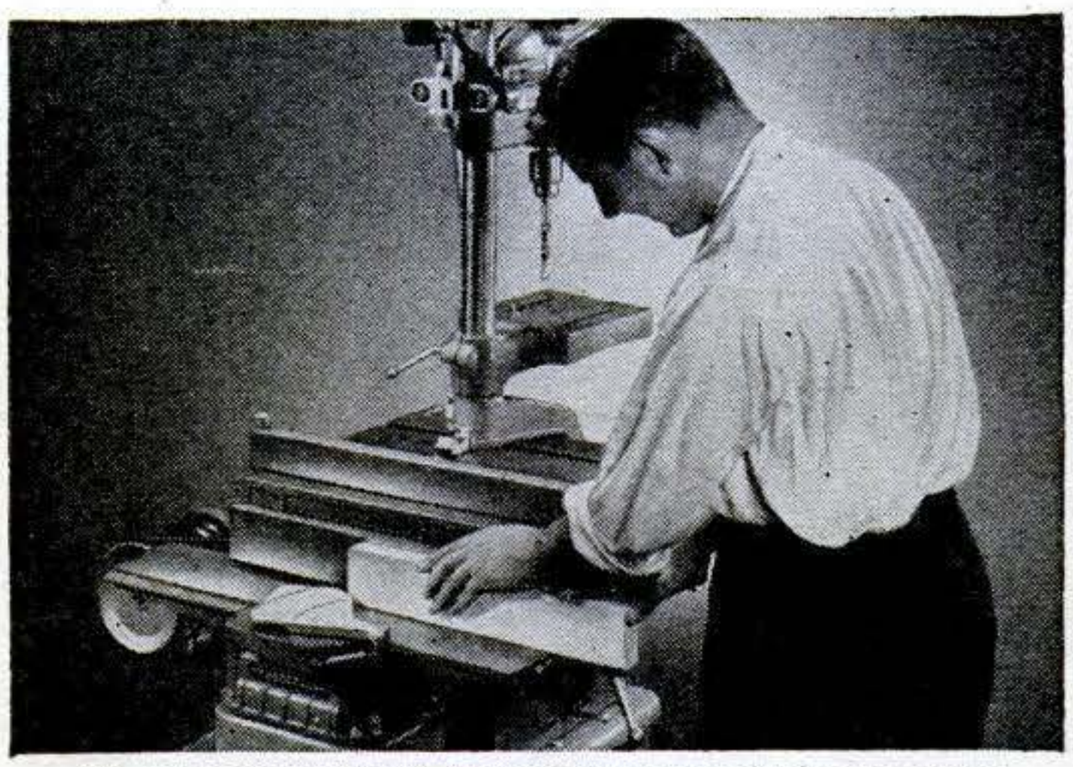
Now You Can Have DELTA Quality in a One-motor Combination Tool

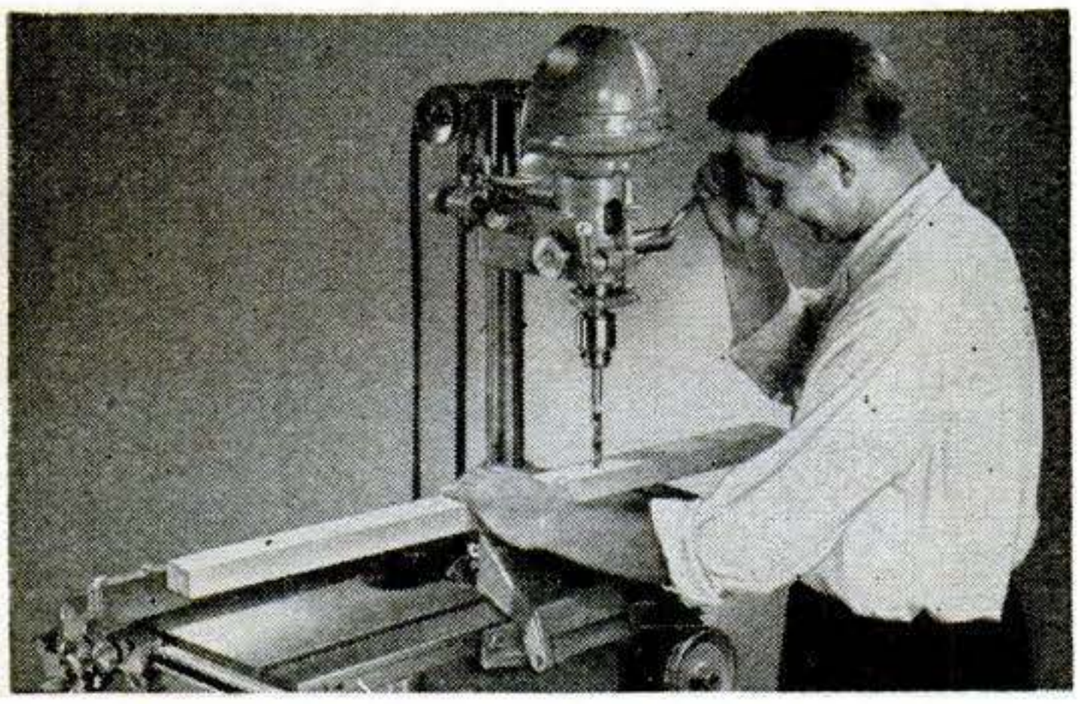
YOU GET THESE COMPLETE DELTA TOOLS IN THE NEW DELTASHOP



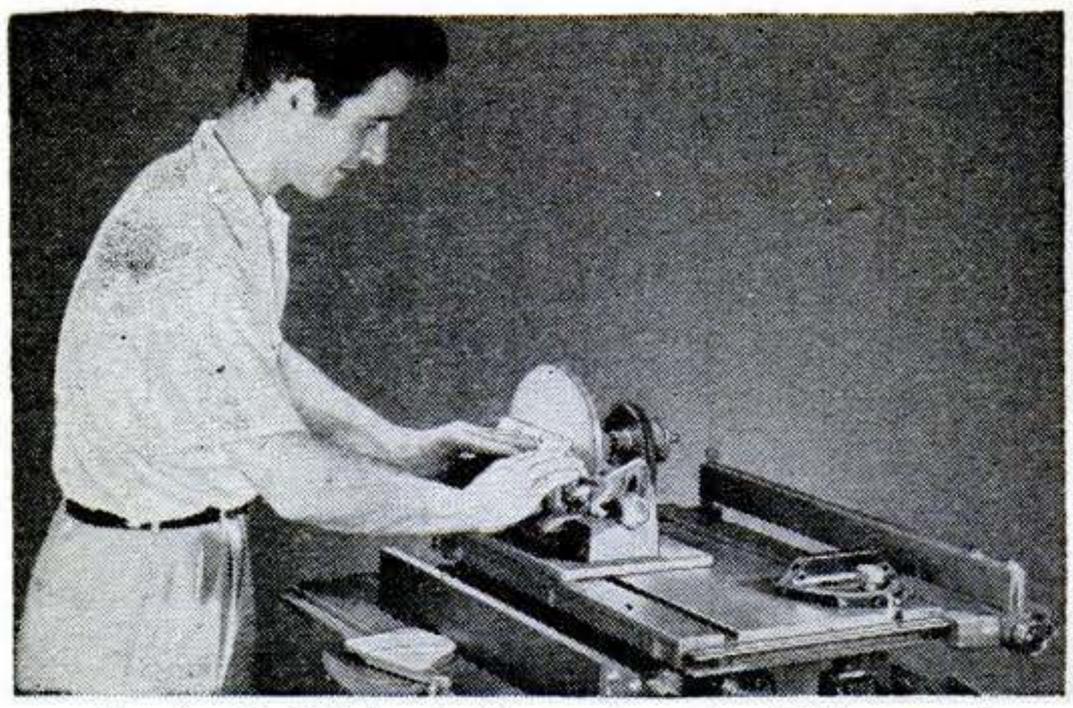
It's built around a rugged 8" tilting arbor circular saw—will cut lumber accurately, easily, quickly.



It's a big capacity 4" Jointer always ready for use when you're ready to plane.



It's a complete 11" Drill Press—makes mouldings, grooves, does many other jobs in addition to drilling—more jobs per dollar than any tool in the shop.



It's a handy Disk Sander for putting a fine finish on wood, plastics, non-ferrous metals; can be used to buff, and polishes many household articles, too.

HERE ARE THE FACTS ABOUT COMBINATION TOOLS

For turning out accurate, fine quality work in the least time, at lowest possible cost, and with greatest safety, there is no method that will approach the use of fine individual Delta tools.

The Deltashop is exactly that—a combination of the basic most-used Delta tools, each doing the particular job it was designed to do. It is the only combination tool built around a circular saw rather than around a seldom-used tool such as the lathe.

The Deltashop is the only combination tool that can grow with your shop without loss of your original investment. You can change it at anytime into the same separate Delta machines you'd buy if you were starting a shop of individual tools.

Deltashop takes up the least space—needs the least time for change-over from tool to tool. With Deltashop you spend your time working, not setting up and trueing up as you change operations.

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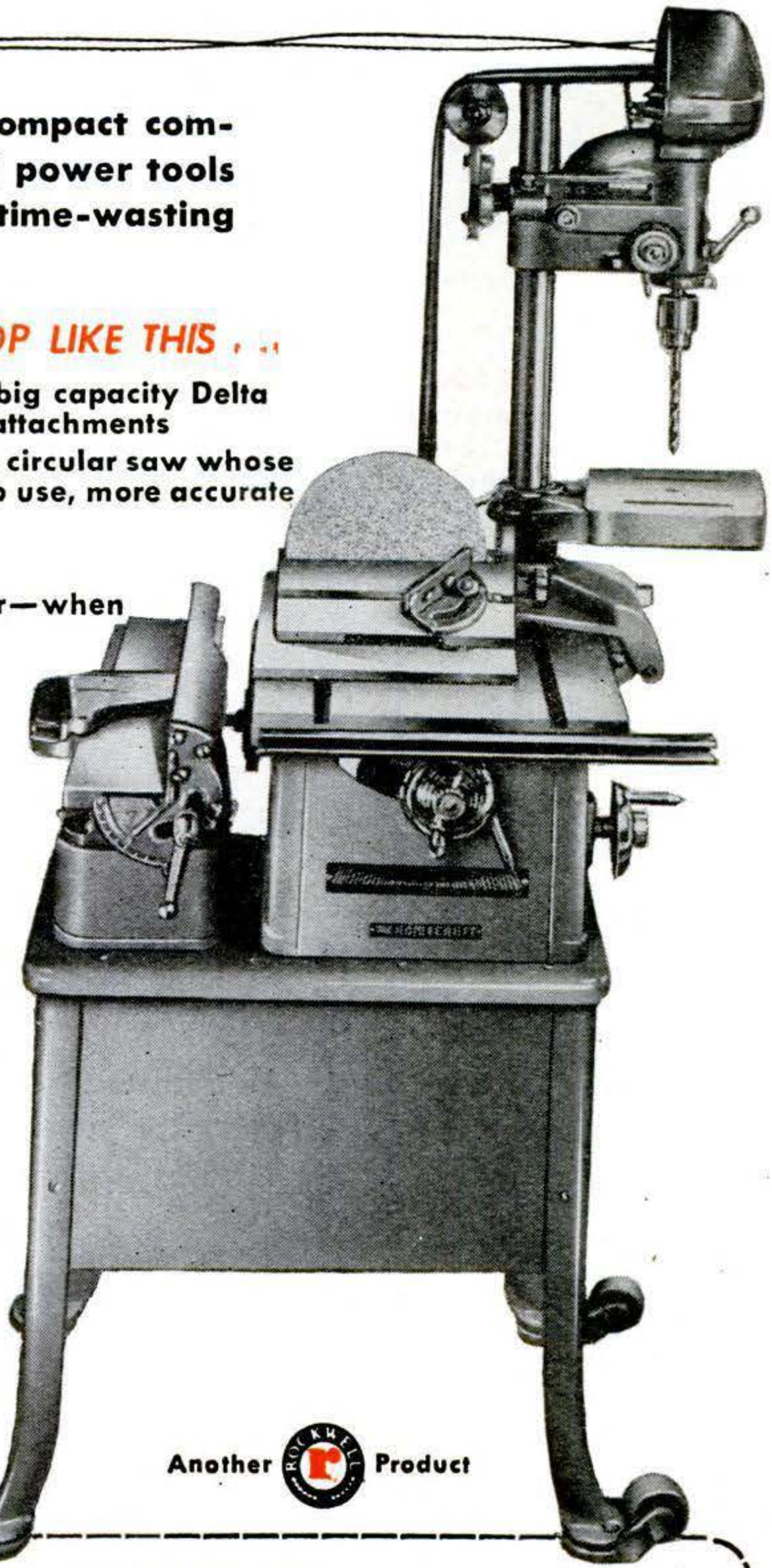
Announcing

the DELTA SHOP

Save space, time, money with this compact combination of the most-used individual power tools —not a group of attachments, no time-wasting adjustments



NEVER BEFORE A COMBINATION SHOP LIKE THIS . . .

- **an engineered combination of high quality, big capacity Delta Homecraft Tools—not a collection of loose attachments**
- **the only combination tool shop built around a circular saw whose *blade* tilts instead of the table—safer, easier to use, more accurate**
- **does 98 per cent of home-shop operations**
- **occupies only a 3-foot square floor area**
- **the only combination tool with a true jointer—when you saw, the next natural step is always to plane an edge!**
- **the only combination unit *you can separate into individual tools* if you wish—later, as your shop grows**
- **built-in accuracy, lifetime durability, outstanding safety features—you don't have to be a machinist or woodworking expert to use the Deltashop**
- **Delta accessories—the only combination tool with the advantage of the world's biggest and best line of accessories that multiply the usefulness of every tool many times over**

Your Deltashop will pay for itself in no time—and even with no experience you'll be able to "do it yourself" with the best of them. Fix things and make things you've wanted—items you've put off buying because of high costs.

See this remarkable combination tool. Look at its rugged strength. See how easy it is to handle and operate. Ask your Delta dealer to demonstrate it. Also send for the new Deltashop Book—tells the whole story of this remarkable new tool development. Use the coupon.

Another Rockwell Product

DELTA
MILWAUKEE

DELTA POWER TOOL DIVISION

Rockwell
MANUFACTURING COMPANY
504M North Lexington Avenue • Pittsburgh 8, Pennsylvania

☐ Please send the Deltashop Book
. . . and the name of the nearest Delta dealer

Name_____

Address_____

City_____ Zone_____ State_____

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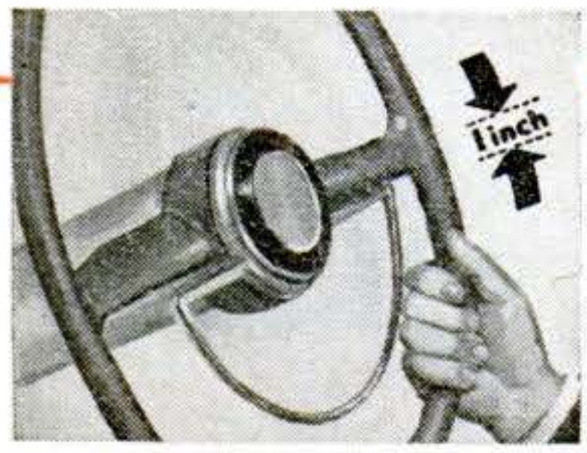
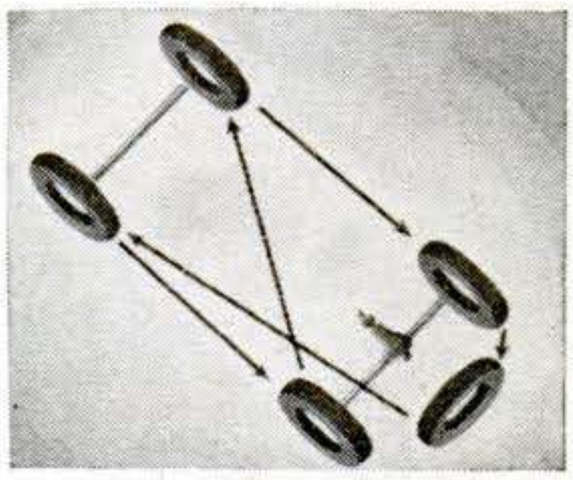
How to get more mileage out of your motoring dollar



CHECK PLAY IN STEERING GEAR

Move steering wheel back and forth when car is at rest. Lack of play may indicate binding. Too much play may indicate worn steering parts that need servicing or replacement to prevent undue tire wear and to avert any possibility of accidents through faulty steering.


CRISS-CROSS TIRES

Shift tires every 5,000 miles for maximum service. Tires wear differently at each "corner" of the car; they should be switched regularly every 5,000 miles. (See diagram for proper rotation that includes spare.) Thus you will get maximum traction, riding comfort and mileage.

CHOOSE THE FINEST FILTER REFILL

Protect vital engine parts from abrasive grit and gummy sludge—keep a fresh oil filter refill on the job. Any filter "loads up" in about 5,000 miles of normal driving—becomes so clogged it can't trap any more contaminants out of the oil stream. Before that happens, put in a Purolator* Refill—the finest money can buy. Matchless accordion-pleated, plastic-impregnated element gives up to 10 times more filtering area than ordinary filters. Yet a Purolator Micronic* costs as little as $1.60.

*Reg. U. S. Pat. Off.

Check your oil filter every time you change your oil

PurOlator
(ENGINEERED FOR EVERY MAKE OF CAR)
Micronic OIL FILTER

[Continued from page 244]

and illustrated with drawings. Retailers don't like to stock toys that cannot be demonstrated in seconds.

Jay Zimmerman of Vintage Products ran into that problem with his Tom Corbett 2-Way phone. It included 50 feet of copper wire and two phones that would amplify the voice by a magnetic sound unit. This phone set will really work up to half a mile without batteries. But its simplicity could not be explained without detailed instructions. These scared the customers away.

So in 1952 Zimmerman redesigned his package to put drawings right on its face, showing just how the phones could be used. Now he has one of the leading space toys on the market and his exciting six-piece phone set is selling by the hundreds of thousands.

Specifications for an Inventor

If you are not only an inventor but also an economist, child-guidance specialist, market researcher and machine-shop foreman, you can succeed in the toy business.

Before you write or call on a manufacturer, you should see a patent attorney. A preliminary patent search will tell you if your idea has been tried before. Many manufacturers will not even look at a designer's new toy unless a patent has been applied for. They do not want to be sued for infringement. A check of patent dates can help remove such fear.

A patent is not absolute insurance against copying, and the toy industry is almost as notorious for this as the fashion industry. A slight change in design may change the exclusiveness of a patent, and a popular toy is usually copied by other firms soon after it hits the market. Nevertheless, a design patent is the best protection available, and it costs only $50 to initiate an application.

Two toy-business magazines* publish

[Continued on page 250]

Playthings Magazine, 71 West 23rd St., NYC;
Toys and Novelties Magazine, 307 North Michigan Ave., Chicago

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Get the most for your money
INSTALL YOUR OWN KENTILE FLOOR

Mrs. William A. Loock Jr. shows you how easy it is to install long-lasting Kentile

Here Mrs. Loock is finding the center of the floor. Next, she'll spread Kentile Adhesive over half the floor before laying the tiles in place.

With half the floor installed, Mrs. Loock spreads Kentile Adhesive to cover remaining half. Then it's simply a matter of putting tiles in place until entire floor is completed.

HERE'S America's most popular floor-covering for homeowner installation . . . low-cost, easy-to-lay, long-wearing. Dirt and stain-resistant . . . gleams like new with occasional, no-rub waxings. Don't make the mistake of buying floor-coverings with just a colored surface that wears off with use. Kentile's 26 wear-proof colors go right through each tile—its durability is assured by this written guarantee. (If you prefer, your Kentile Dealer will install your floor.)

KENTILE

GUARANTEE

FOR SELF-INSTALLED KENTILE

Kentile, Inc. will provide new tile without charge for any Kentile that wears out . . . and on which colors wear off . . . during your own occupancy of your home wherein you have installed Kentile. This guarantee does not apply to damage caused by improper handling, or failure to follow the instructions for installation and maintenance available at your Kentile dealer's.

Only Kentile Dealers offer you these low-priced Guaranteed Kentile Floors

*Price quoted is for a Kentile Floor approximately 8′ x 10′ installed by you. Your Kentile Floor may cost less or slightly more, depending on size of room, colors and freight rates. See your local Kentile Dealer . . . he's listed in the classified phone directory under FLOORS. *In Canada, T. Eaton Co., Ltd.*

Write for your FREE Kentile Color Book showing all the colors of low-cost Kentile and easy-to-follow instruction booklet

KENTILE, INC., 58 2nd Ave., Dept. H-10, B'klyn 15, N. Y.

KENTILE®

The Asphalt Tile of Enduring Beauty

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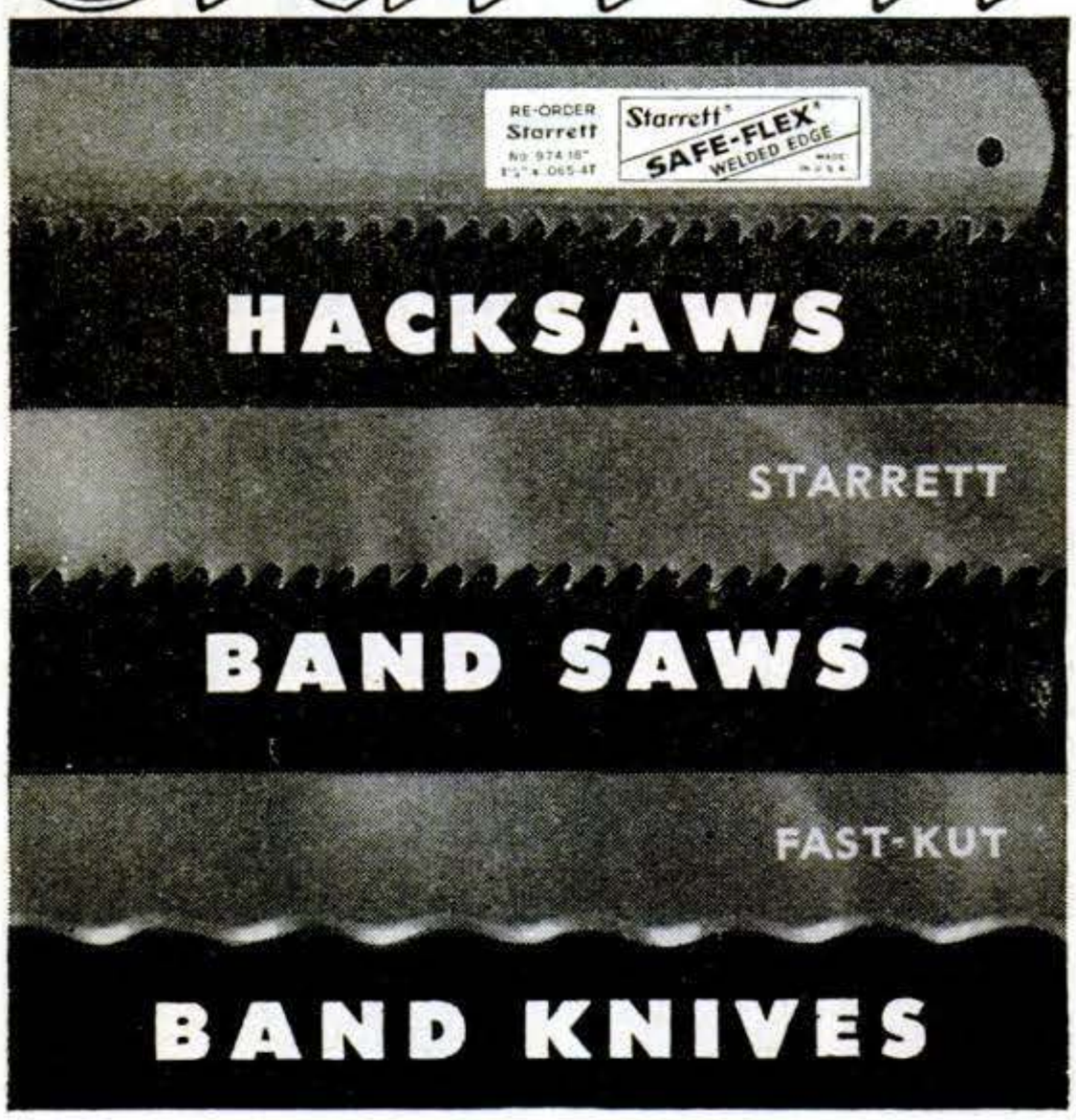
Starrett



Whether you cut, saw or slice, you can be sure of peak performance with Starrett blades and bands. The complete line includes all types of hacksaws for hand or power cutting — band saws for cutting metal, wood, plastics, contour cutting, friction sawing, etc. . . and band knives for cutting any soft or fibrous material.

SEND FOR IT — ONLY 10¢
Starrett "Tools and Rules" Book
shows the right tools for any measuring job. 50 pages, 100 pictures, helpful reference tables. Address Dept. PS

THE L. S. STARRETT COMPANY · ATHOL, MASS., U.S.A.

STARRETT TOOLS
TRADE MARK
Starrett
REG U S PAT OFF
SINCE 1880
WORLD'S GREATEST TOOLMAKERS
Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR
Prompt delivery
Dependable service
Quality products

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

How Toy Inventors Sell Their Ideas

[Continued from page 248]

excellent directories of established manufacturers and the types of toys they make. Try first the firms that already make the type of toy you hope to sell.

Most manufacturers prefer to have you write a letter to them first, briefly outlining your idea. If they see possibilities in the idea, they will suggest an appointment. The average toy maker sees between 300 to 500 different toy designs each year. He usually makes between three and five new toys a year, so your odds are roughly 100 to one.

This is why your toy should be as nearly perfect as possible before you try to interest a manufacturer. Why should he spend time and money ironing out technical problems that you haven't been able to figure out? Show him a finished model of your toy if you can.

Consultants May Help

To help the designer who does not have the time or know-how to check with manufacturers, there are professional organizations which act as agents, consultants and promoters on a commission basis. Some of these firms are excellent and highly respectable. But this cannot be said of all of them.

It takes weeks, sometimes months, of negotiations to complete the sale of a design. It is best to have your lawyer in on the final discussions. You can expect a royalty payment of from two to five percent of the wholesale price.

When a toy makes a small fortune for its inventor, it is usually based on such a simple, logical idea that everyone immediately asks himself, "How come someone didn't think of that before?" A hundred other people probably did. They were just too "busy" to do anything about it. END

First Things First

THE first motorists watched for holes in the road; the modern motorists watch for holes in the traffic.—*Fireman's Fund Record*

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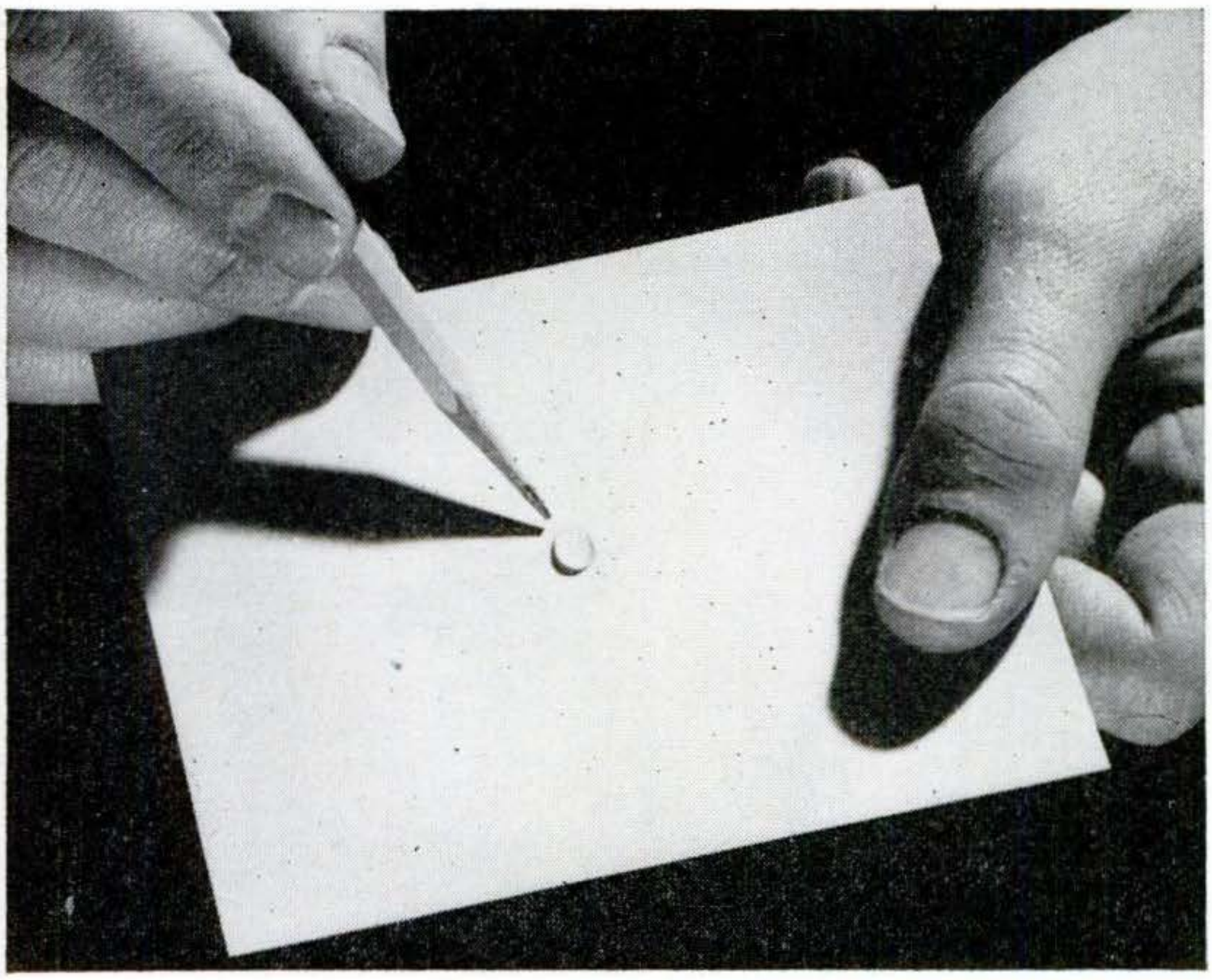
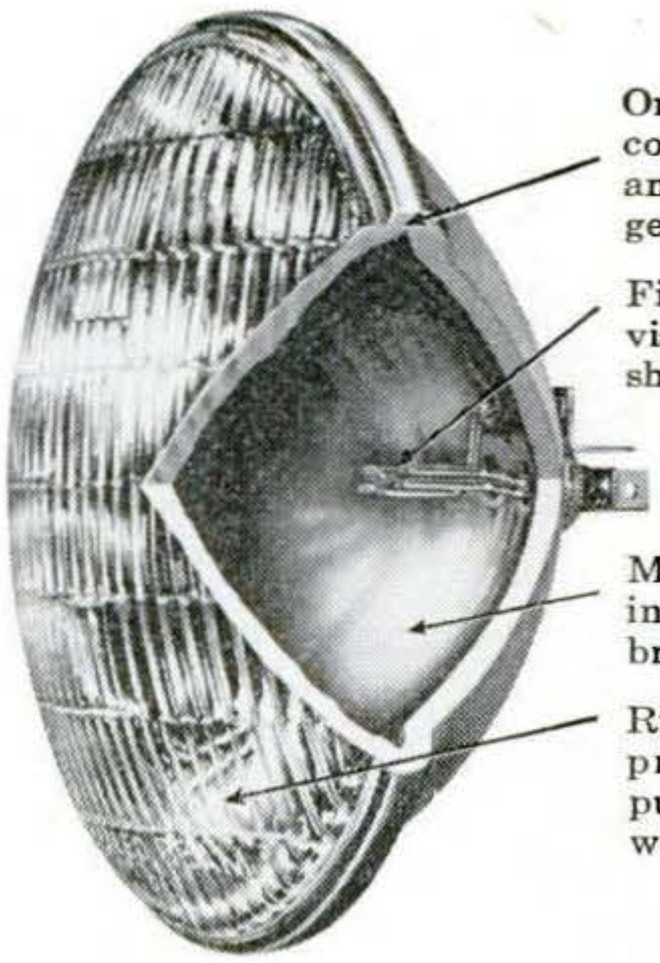
There is a difference in sealed-beam headlamps



...and this is it

All-Glass sealed-beam headlamps do not grow dim

When moisture collects inside a headlamp and deteriorates the reflector, it cuts light output. Unless your headlamps are All-Glass, you may be able actually to see traces of moisture inside. But there's one way to be *sure* your headlamps are not growing dim. Replace them with G-E All-Glass headlamps. Because they're *All-Glass*, all one big bulb, there's no way for water to get in. Tests show that General Electric sealed-beam headlamps average 99% as much light after years of service as when new. Be sure to specify G-E All-Glass headlamps.



You can put your confidence in—

GENERAL ELECTRIC

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FOR HIM
The HE-MAN GIFT

PLUMB

Gift Wrapped
in brightly colored celophane sleeves. Please him with a Plumb Tool — the gift *he'd* choose, the present he'll use.

The black head and red handle —exclusively PLUMB

The Plumb Axe for your outdoorsman —it will last a lifetime.

Man or boy, he'll appreciate this Plumb Hatchet.

HAPPY HOLIDAY! YOURS FOR YEAR-ROUND PLEASURE!

Quality Comes FIRST
PLUMB
is FIRST in Quality

PLUMB®

HAMMERS • HATCHETS • AXES • FILES

Gus Stops the Music

[*Continued from page 196*]

like clockwork, I get a customer with a bug that defies location—for a while. People have brought me twitters, squeaks, howls and moans, but this is the first time I haven't been able to find it!"

"Maybe I'd do well to sell the car."

"No, you don't have to go that far. That noise isn't anything that's going to cause it to stall on you."

Adamus Explains His Strange Gift

"Mr. Wilson—" Adamus no longer looked like a character, but like a serious, saddened little man under a great nervous strain—"Mr. Wilson, it's either fix the car or sell it. Maybe you think I'm odd, like all the rest, and it's probably true. But it isn't artistic temperament that causes me to behave like this over a small noise. I believe I mentioned it before. It's my absolute pitch. I am able to identify notes, or name individually the notes in a complex chord of music, merely by the sound. Therefore, when an instrument or a singer drifts off key by only a hair, I can spot it immediately. Most people with the gift are not overly bothered by a note that's a fraction above or below what it should be. But with me, it's as distressing and painful as an allergy. I become nervous and irritable, and can't concentrate on my job properly. For a minute or two it doesn't bother me, but when I have to listen to it for 40 minutes while I drive to school every morning . . . Well, how can I make you understand?"

Gus Gets Back to Work

"I do understand." Gus smiled sympathetically. "A rough-running engine will get my nerves to hopping after a while, too. But just relax and let me work on it. We're bound to spot the trouble soon."

Gus got up. The words were far more confident than the way he felt, but he couldn't quit yet.

He started the motor again, locked the throttle at an engine speed just sufficient to start it whistling, and began looking.

Gus went over the engine inch by inch, probing, testing, until as far as he was concerned, it was still the air cleaner. He felt sure now that he had been right in the first place, and that taking other causes and the deceptiveness of noise into consideration

[*Continued on page 254*]

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How to cut down the high cost of upkeep

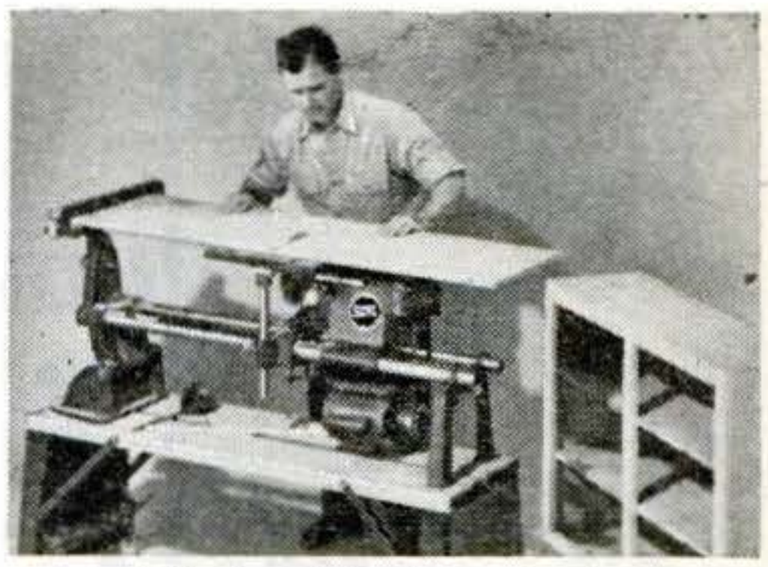
With SHOPSMITH, you can have a made-to-order power tool for every household job!

In each position, SHOPSMITH equals or exceeds single-purpose tools in capacity, accuracy, ease of operation!

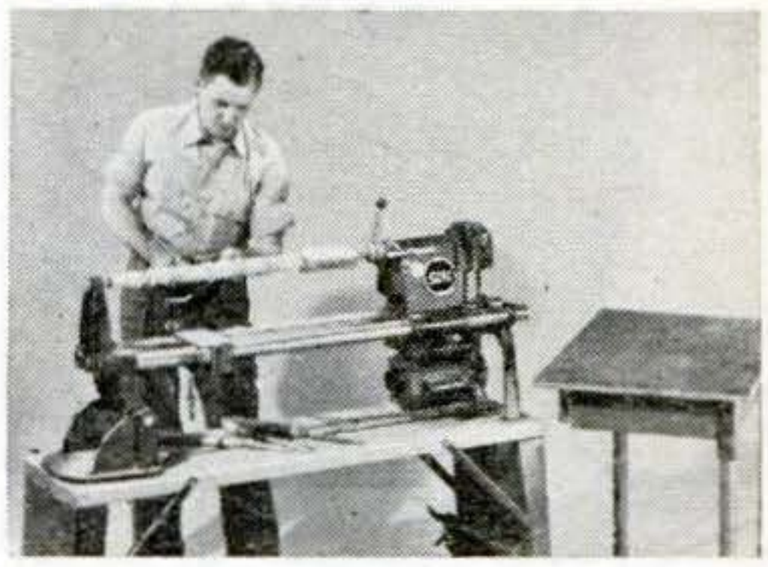
SHOPSMITH'S "changeability" saves you space, equips you to handle over 100 different operations. Changeover time is less than a minute!

SHOPSMITH costs $189.50 complete except for motor ($34.50) and bench ends ($9.95). See it demonstrated at leading hardware and department stores or any Montgomery Ward store.

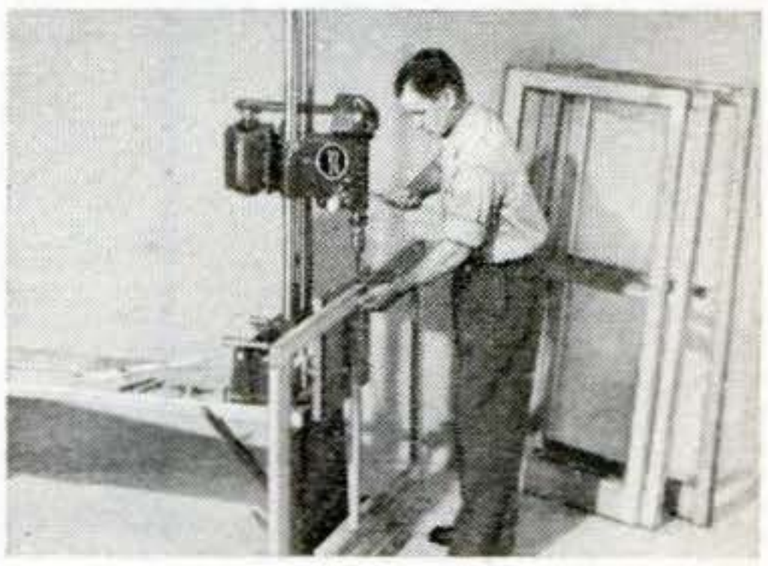
SAVE UP TO 70% ON BUILT-INS! You can turn out professional-quality cabinetwork with SHOPSMITH. As 8-inch circular saw, SHOPSMITH features extra-large capacity, hairline accuracy, simple adjustments.



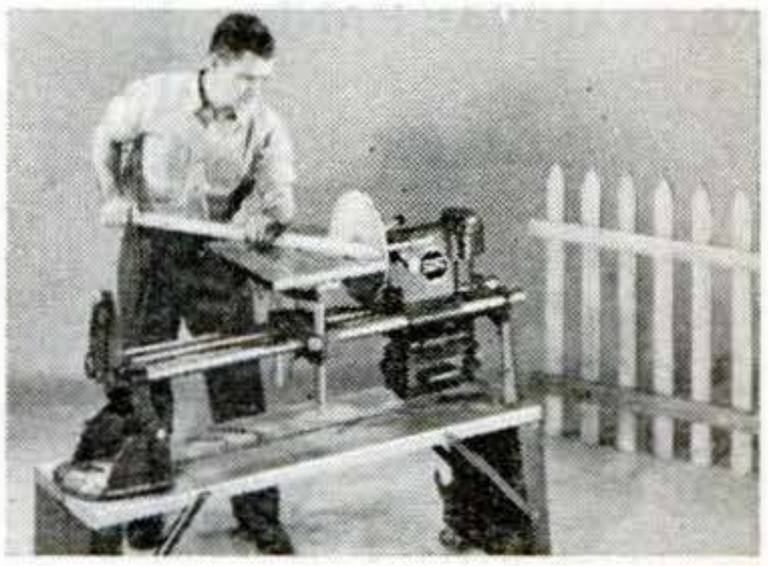
FURNITURE REPAIRING MADE EASY! You can replace a broken table leg or rebuild priceless antiques — SHOPSMITH'S simple, functional design makes either an easy job. Lathe has 15-inch swing, 33 inches between centers.



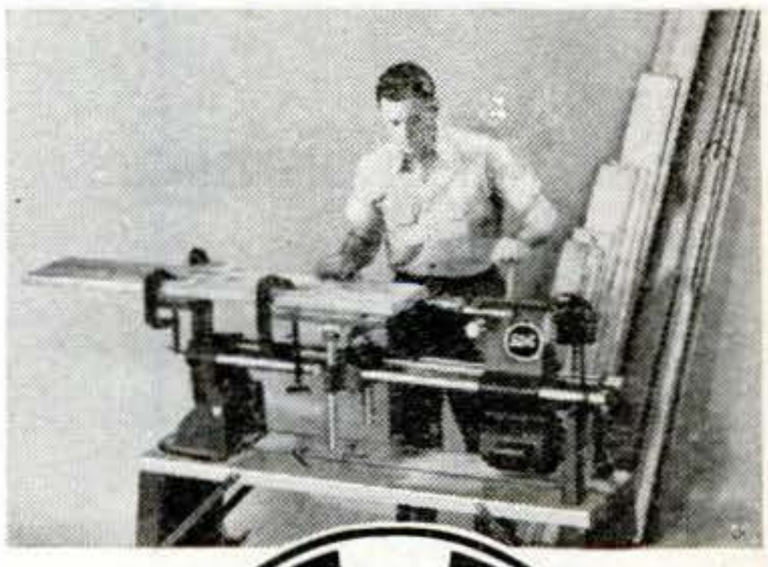
MAKE YOUR OWN STORM WINDOWS! Save up to $12 each! SHOPSMITH'S unique flexibility speeds the job by making special jigs unnecessary. In vertical drill press position, SHOPSMITH is a multi-purpose tool in itself!



MIGHTY HANDY FINISHING TOOL! If you've ever tried to point fence pickets (after they've been sawed), you know how useful the SHOPSMITH 12-inch disc sander can be. Also used for extremely accurate jointing.



DO 1001 JOBS FASTER, EASIER! Any sawing, sanding, turning or drilling job is quickly mastered when you have SHOPSMITH. Horizontal drill, for example, easily handles work too big or too awkward for most drill presses.



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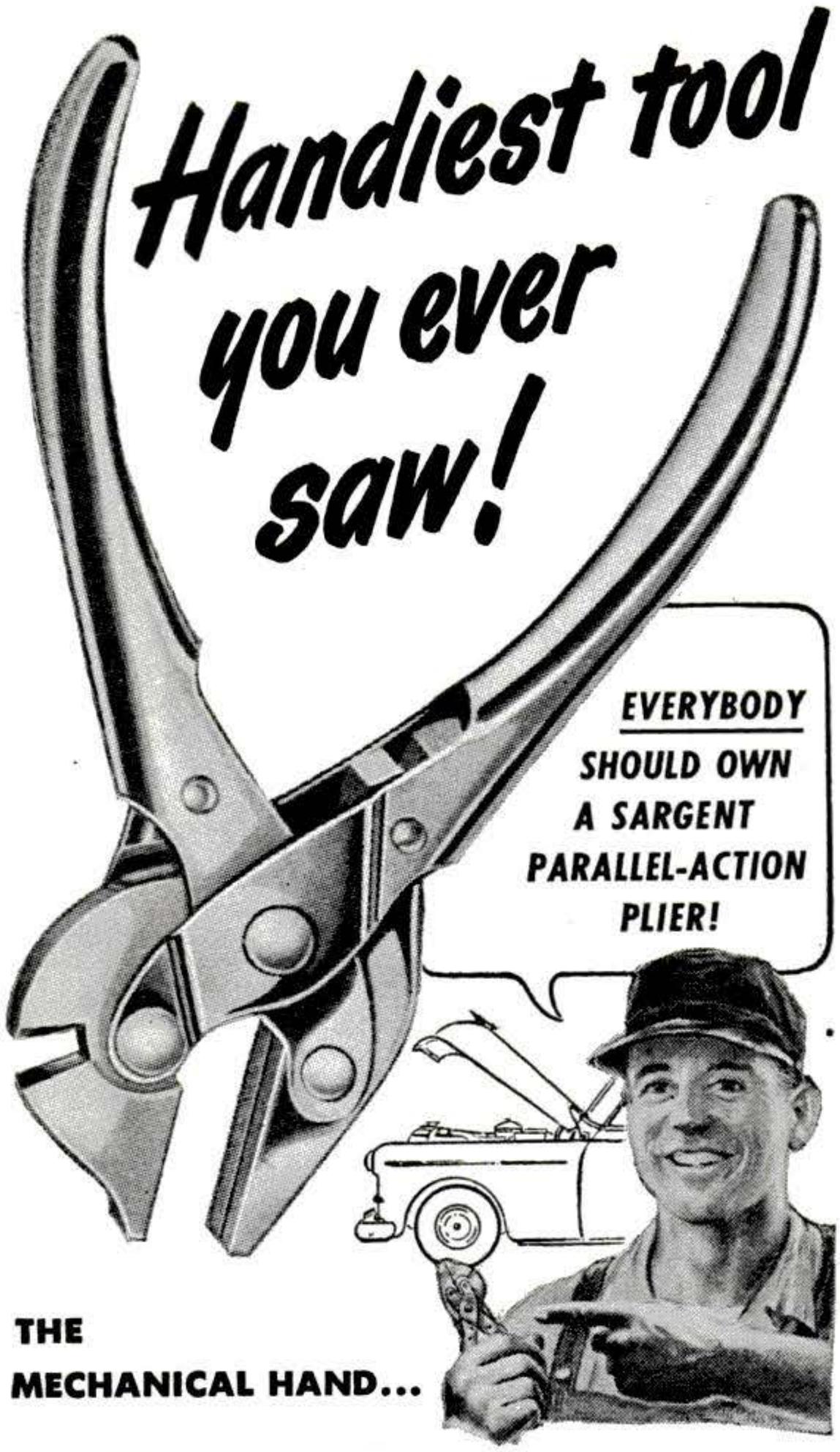
Handiest tool you ever saw!



THE MECHANICAL HAND...

1. GRIPS LIKE A VISE

... a wrench-like grip that doesn't slip. Compound leverage multiplies power along entire length of jaws.

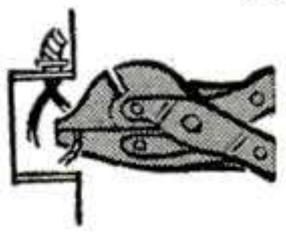
2. CUTS WIRE EASILY

... outside cutters cut wire even when it tightly hugs a flat surface.

3. HOLDS NUTS LIKE A WRENCH

... powerful parallel jaws and extra leverage prevent rounding corners.

4. GETS INTO TIGHT SPOTS



... small nose of jaws permits working in close quarters.

5. UNKINKS WIRE

... run wire between jaws, from either end, to straighten or pull it.

Don't be without your Sargent Parallel-Action Plier another day. See 4½, 5½, 6½, and 8 inch lengths at your hardware dealer. Mechanics, sportsmen, farmers and handymen call it their favorite. For further details, write Dept. 26 L.

SARGENT of New Haven ®

SARGENT AND COMPANY
New York
NEW HAVEN, CONN.
Chicago

Builders Hardware and Fine Tools Since 1864

Gus Stops the Music

[*Continued from page 252*]

had merely led him on a wild-goose chase. The air cleaner had to be it. He removed the suspect without turning off the engine. The whistle stopped.

The Case of the Baffling Baffle

"I don't care what those three mechanics told you. This is what does it, but I don't know why. It's not a complicated gadget. This copper mesh, coated with oil, filters dirt out of the air before it goes into the carburetor. And to deaden the sound made by the carburetor, a couple of resonance chambers inside act as . . . whoops!" Gus grabbed at the air cleaner as it bobbled in his hands—he had almost dropped it. "They act as a baffle. Not much could happen to it unless some foreign matter got inside somehow, or if it was dropped . . ."

He stared at Adamus with a sudden light in his eye.

Gus turned the cleaner over and looked at the bottom. It was coated with a layer of grease and dirt, where the mechanics' rags had not reached. Gus wiped it clean. There were no cracks or holes to catch his eye, but there was one small dent. It was no bigger than the nail of his little finger. He showed it to Adamus.

"That? I'm only a musician, but how could that little dent cause all that hideous noise?"

"I don't know for sure, but let me check."

Gus Goes By the Book

Gus pulled out a manual on the new Chrysler and turned to some diagrams. He studied them for a while and inspected the air cleaner critically. He shook his head.

"I don't think I ought to try removing the dent. I don't think we'd get the best results that way. It would be quicker and more certain to try a new air cleaner. I don't have one here, but I can run down to Martin's and pick one up. Won't take long—want to wait?"

"Oh sure." Adamus' tone was resigned, though not too hopeful. "I'll wait."

In a quarter of an hour, Gus was back. He unpacked the shiny new air cleaner and installed it on Adamus' car.

"Now we shall see."

Gus and Adamus listened in breathless suspense as Gus started up the engine and

[*Continued on page 256*]

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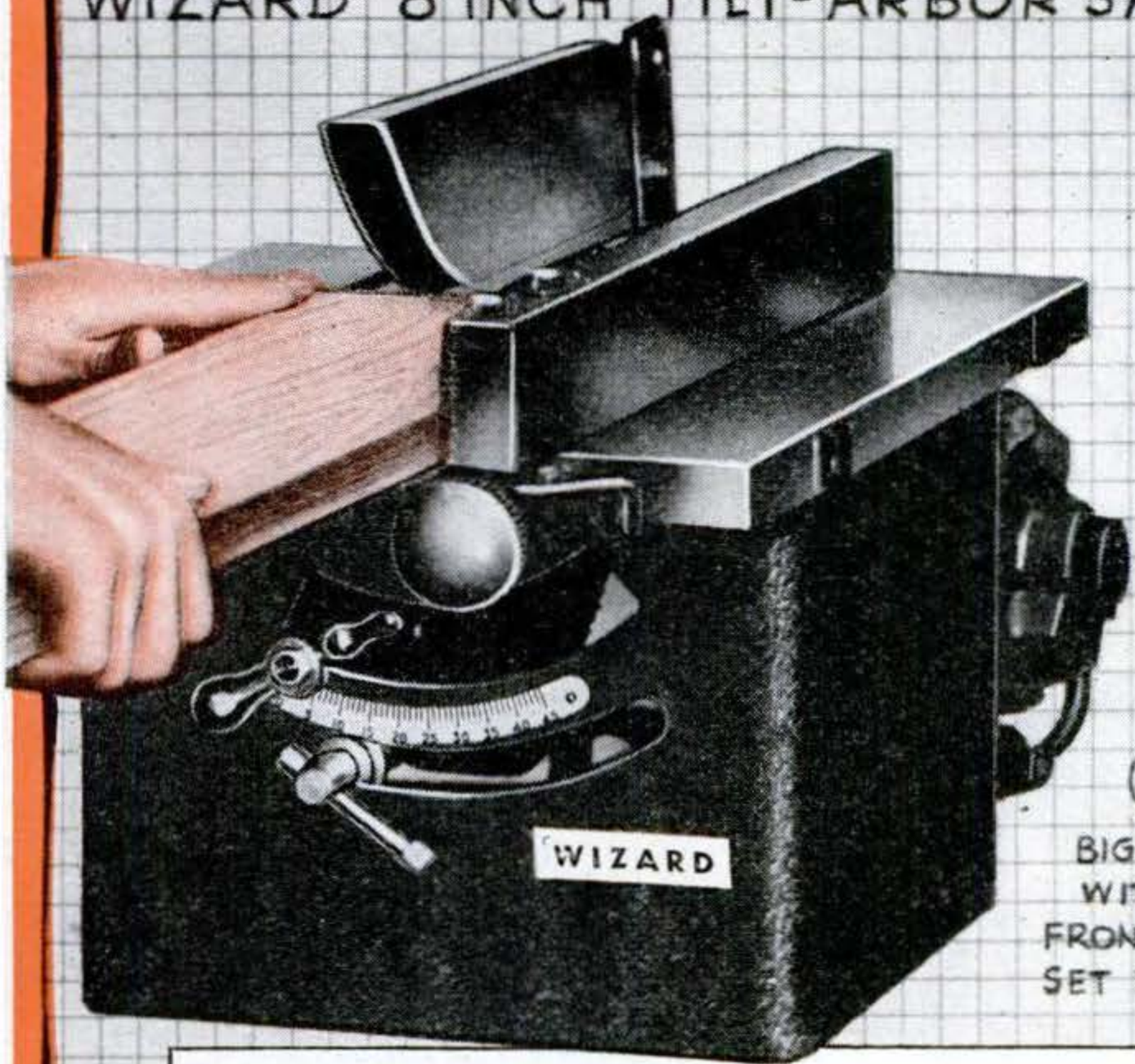
How Creative Designing Gives You This Easier Working, Precision Bench Saw:

WIZARD 8 INCH TILT-ARBOR SAW



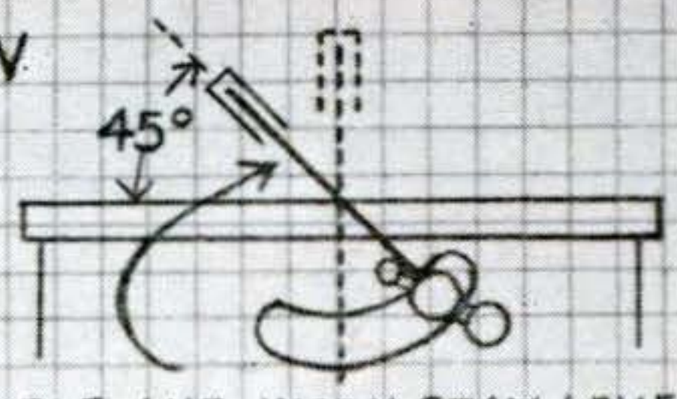
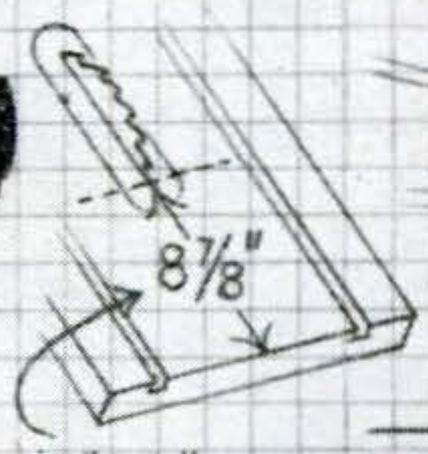
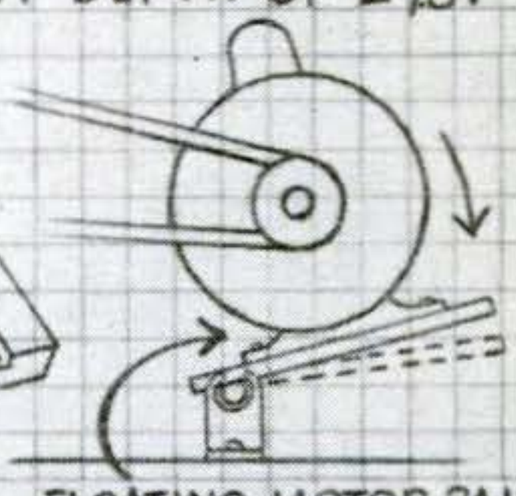


TABLE AND WORK STAY LEVEL WHILE BLADE TILTS TO 45°... BEVEL CUTS A 2"X4" MAXIMUM STRAIGHT CUT DEPTH OF 2 5/8".



BIG 17"X14" TABLE WITH FULL 8 7/8" FRONT WHEN BLADE SET FOR 1" CUT.



FLOATING MOTOR RAIL CONTROLS BELT TENSION FOR EFFICIENT OPERATION.

Fix-up jobs and woodworking are fun with this rugged saw. Save hours of tiresome hand sawing . . . your work's done with greater accuracy *in minutes!* 8" combination blade zips through piece after piece . . . rips, crosscuts, rabbets, bevels! Dado capacity: 1 5/8" deep, 11/16" wide. 1/2" ball-bearing arbor never needs oiling. Complete with blade, guard, splitter, V-belt, pulley, motor rail, miter gauge, fence. (2H1006) **$53.95**

WESTCRAFT 1/2" SOCKET SET

12-PIECE SQUARE DRIVE

Quick, Easy tightening at any angle! 10 most-used alloy steel 12-pt. sockets with hot broached, uniform tapered walls. Chrome plated. Tee Flex handle & crossbar. Metal box. (HR2950) .. **$9.45**

WIZARD ELECTRIC 1/4" DRILL

Whirls through wood, metal, plastic in a flash! Motor gives perfect speed-power balance. Alloy steel-cut gears. Trigger switch. Precision "hand-tite" chuck. (2H1379) **$12.48**

CHOOSE FROM OVER 1,100

Wizard-Westcraft Tools (SOLD ONLY BY) Western Auto

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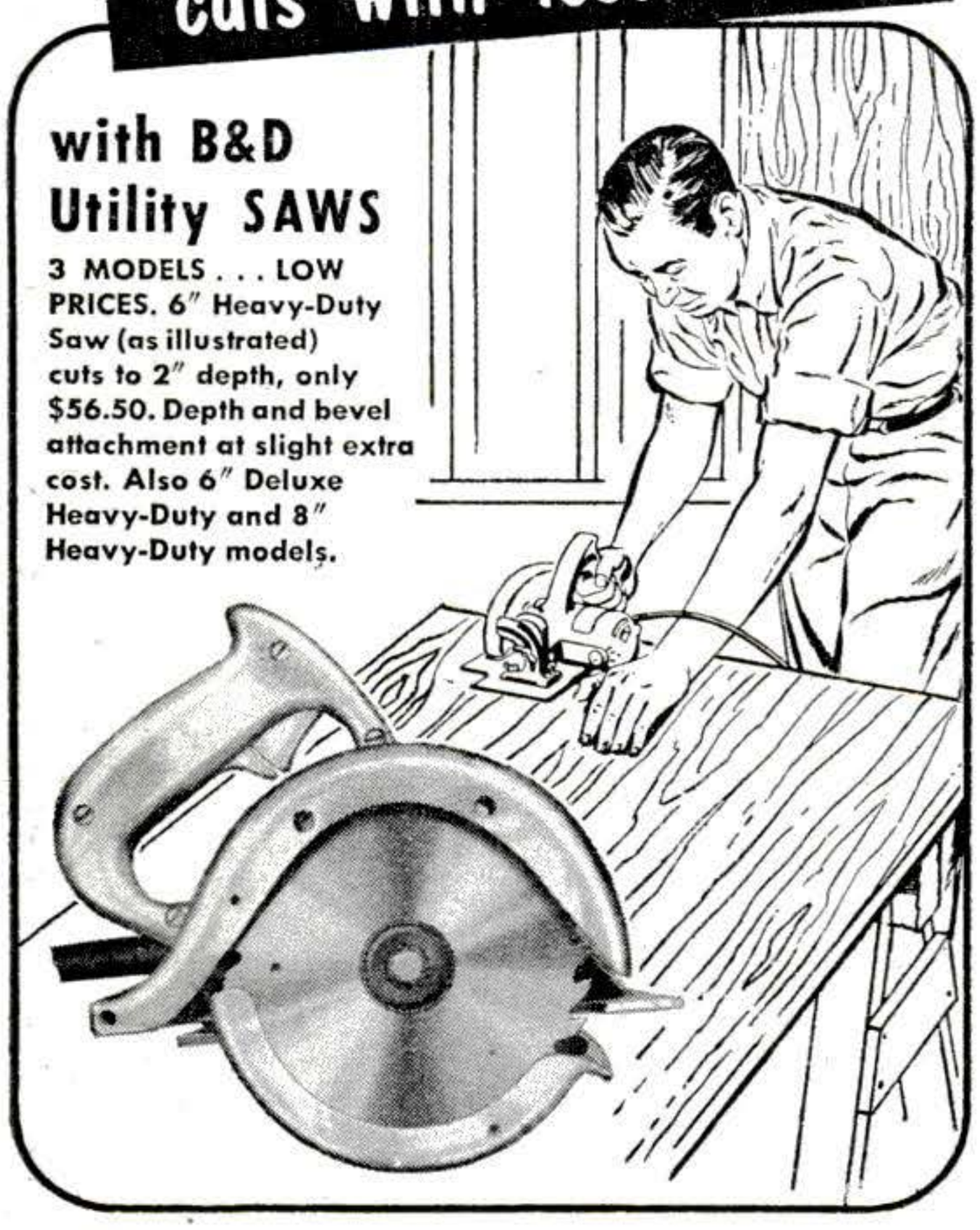
Get smoother, straighter cuts with less work!



with B&D Utility SAWS

3 MODELS . . . LOW PRICES. 6″ Heavy-Duty Saw (as illustrated) cuts to 2″ depth, only $56.50. Depth and bevel attachment at slight extra cost. Also 6″ Deluxe Heavy-Duty and 8″ Heavy-Duty models.

WHETHER you're building a club cellar, garage, a playhouse for the kids, or doing some more modest project, you'll make every saw cut neater and smoother with a lot less labor if you use a B&D Utility Electric Saw! Actually cuts 10 times faster than a hand saw, and all *you* do is guide it! Helps you handle more projects in less time . . . pays for itself in a few jobs!

Try one at your hardware, appliance, building supply or department store. See its powerful B&D-built motor, perfect balance, quick-operating depth and bevel adjustments, safety features, quality construction throughout!

Bob Davis says: When you buy a power *tool* make sure it's not a *toy!* Choose the *brand the experts prefer* . . . BLACK & DECKER!

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Gus Stops the Music

[*Continued from page 254*]

slowly raised the speed. The engine reached close to its peak r.p.m. without a whistle.

"Thank heavens!" Adamus exulted.

"That dent was it, all right. I guess someone dropped it while it was being cleaned."

"Mr. Wilson, I congratulate you. But I still don't understand about the dent."

"Well, I wasn't too clear on it myself. It was merely a hunch until I looked in the book here."

Gus got the original cleaner and showed Adamus how the thing worked.

Just a Little Dent Did It

"Remember before, I told you this thing acts as a baffle? Well, to begin with, you have a felt pad in here, just under the cover, that absorbs the hissing noise produced in the carburetor as air strikes the throttle blade.

"Now, there's also quite a bit of noise down here in the intake manifold, and to quiet that down there are two resonator chambers, one of high frequency and one low. These chambers neutralize the noise by reflecting sound waves exactly out of phase with the original sound waves. What I had never considered before is what might happen if a dent changed the shape and volume of one of those chambers. That little dent was enough to cause the frequency of those sound waves to be *in* phase with the original sound, instead of the opposite as it should be. Just a quirk of chance, I guess.

"But at any rate, it would be too difficult to remove that dent to the perfection needed. The new unit isn't expensive."

Johnathan Adamus ran a glad hand through his hair and grinned.

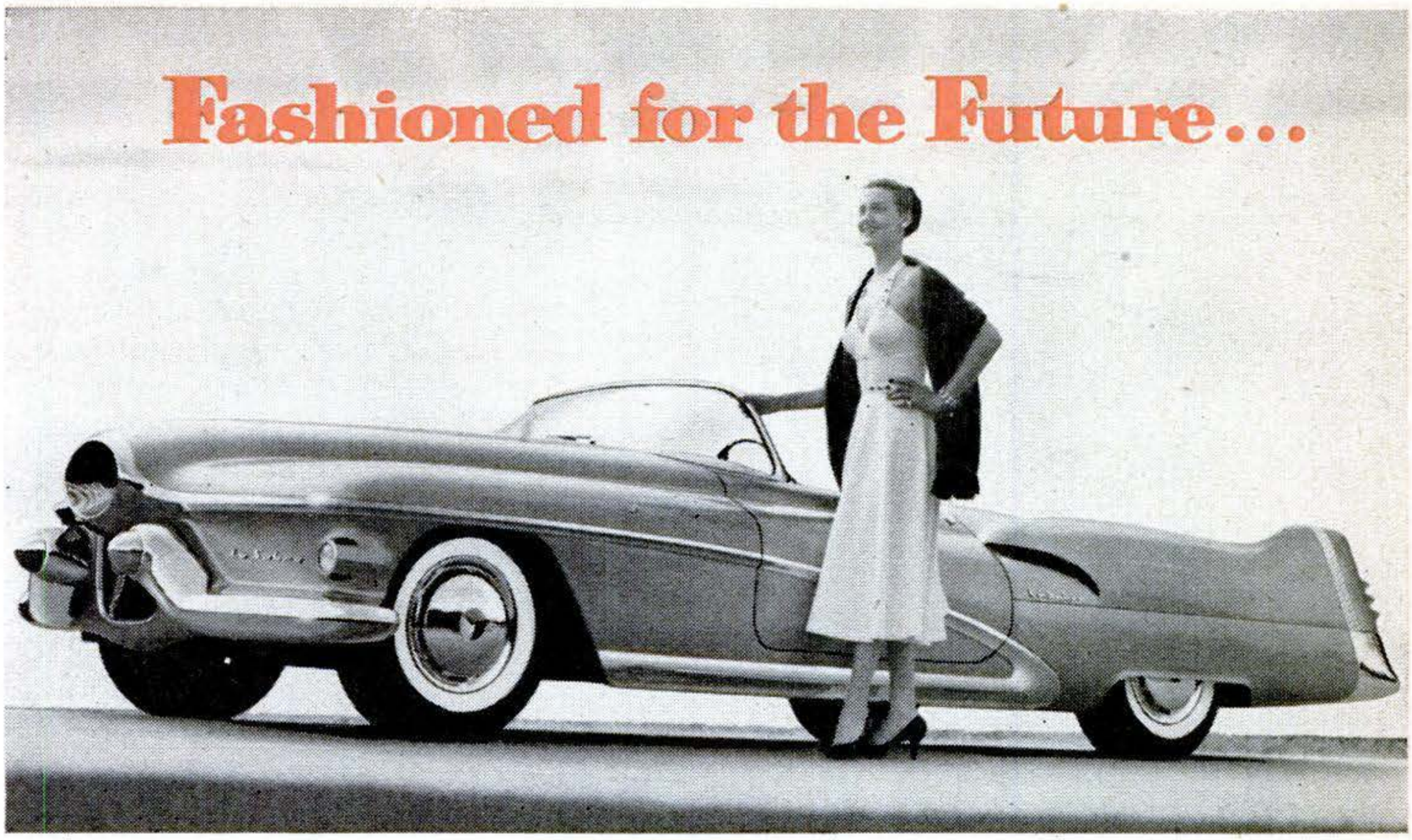
"Mr. Wilson, I don't care if that gadget is made of platinum—the noise is gone." He leaped into the driver's seat like a steeplechaser mounting his favorite steed, raced the engine and cocked an ear. "Just listen to that rhythm. Not a whistle or squeal. It's music to my ears!" END

A Matter of Breeding

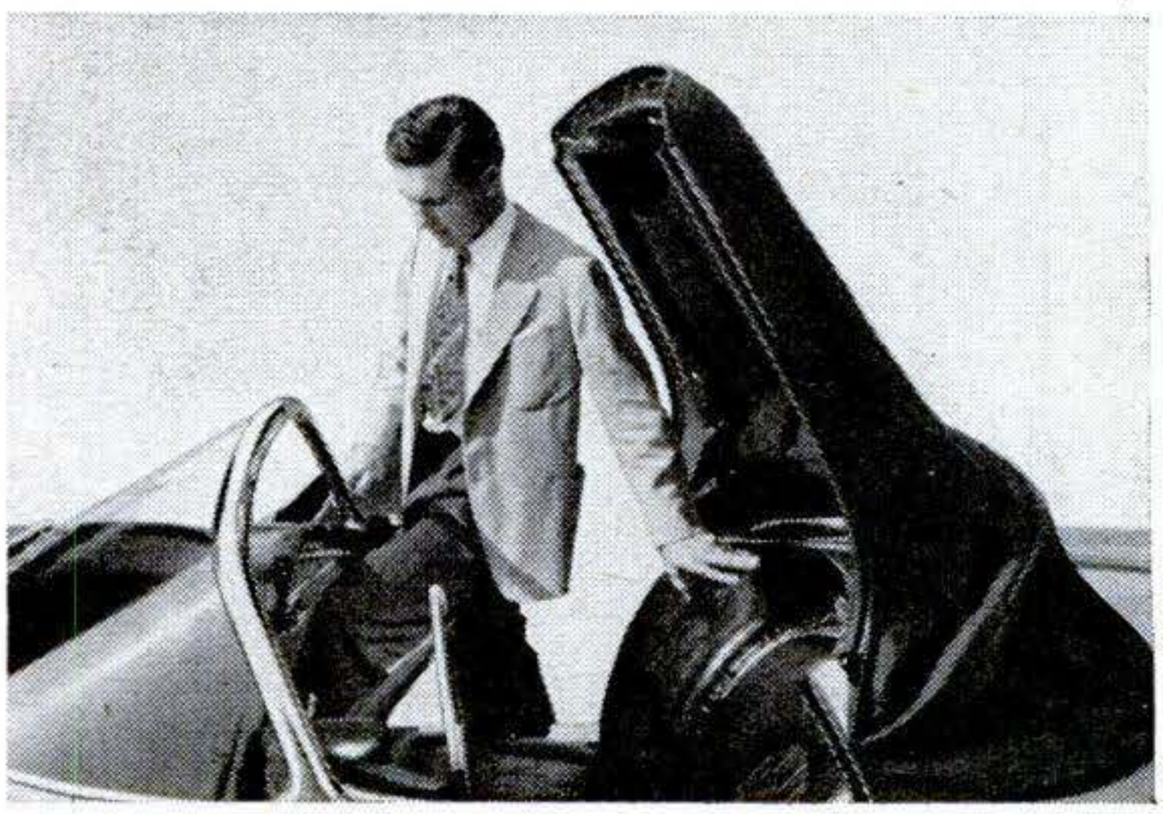
"BUT officer, you can't arrest me. I come from one of the finest families in Virginia."

"That's all right, buddy, I'm arresting you for speeding—not breeding purposes."—*ENKA Voice*

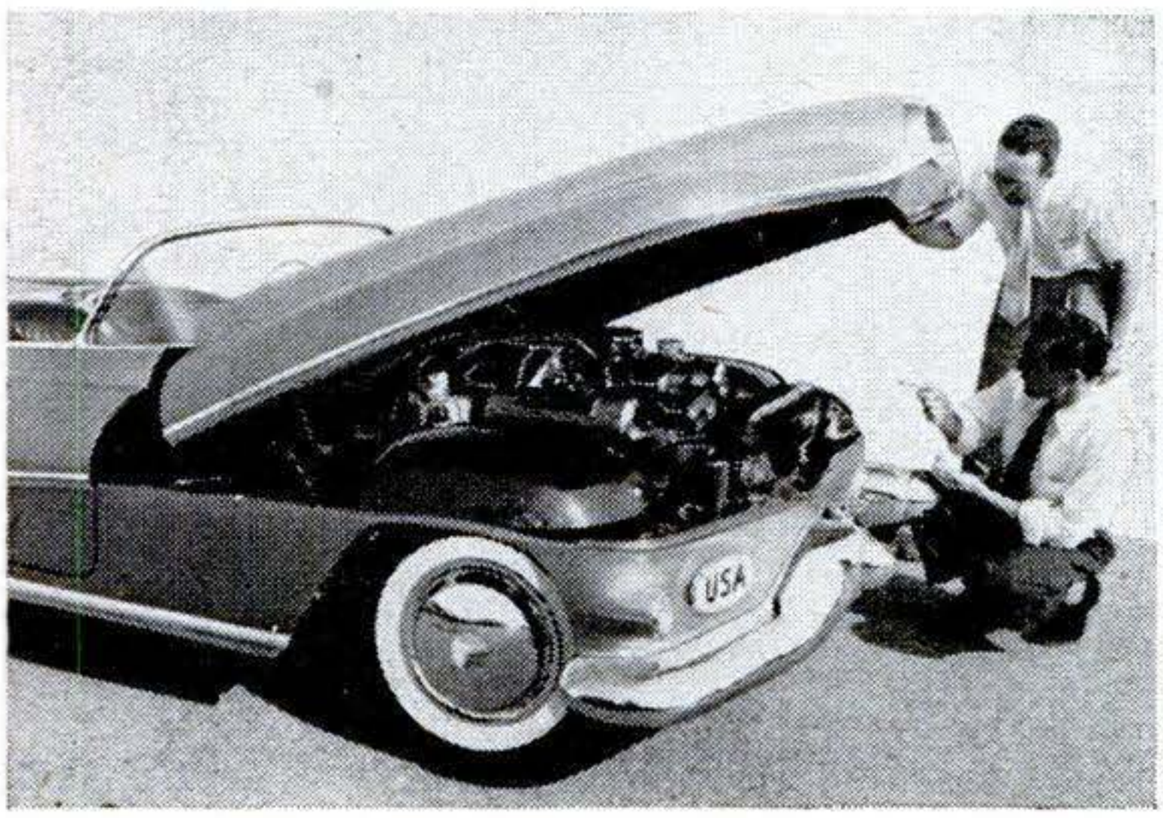
Fashioned for the Future...



STYLED FOR THE FUTURE



FEATURES OF THE FUTURE



POWERED FOR THE FUTURE

What will tomorrow's motor car be like?

Motorists can find many indications of a very wonderful tomorrow in the spectacular General Motors experimental car—*Le Sabre.*

To spark the Le Sabre 335 horsepower engine, its designers selected AC Spark Plugs. Exhaustive tests proved that AC's patented *CORALOX* Insulator best withstood the extreme temperature and high compression developed in this high-powered engine.

What all this adds up to—for today's motoring *and* tomorrow's—is better spark plug performance. Insist upon ACs for *your* car.

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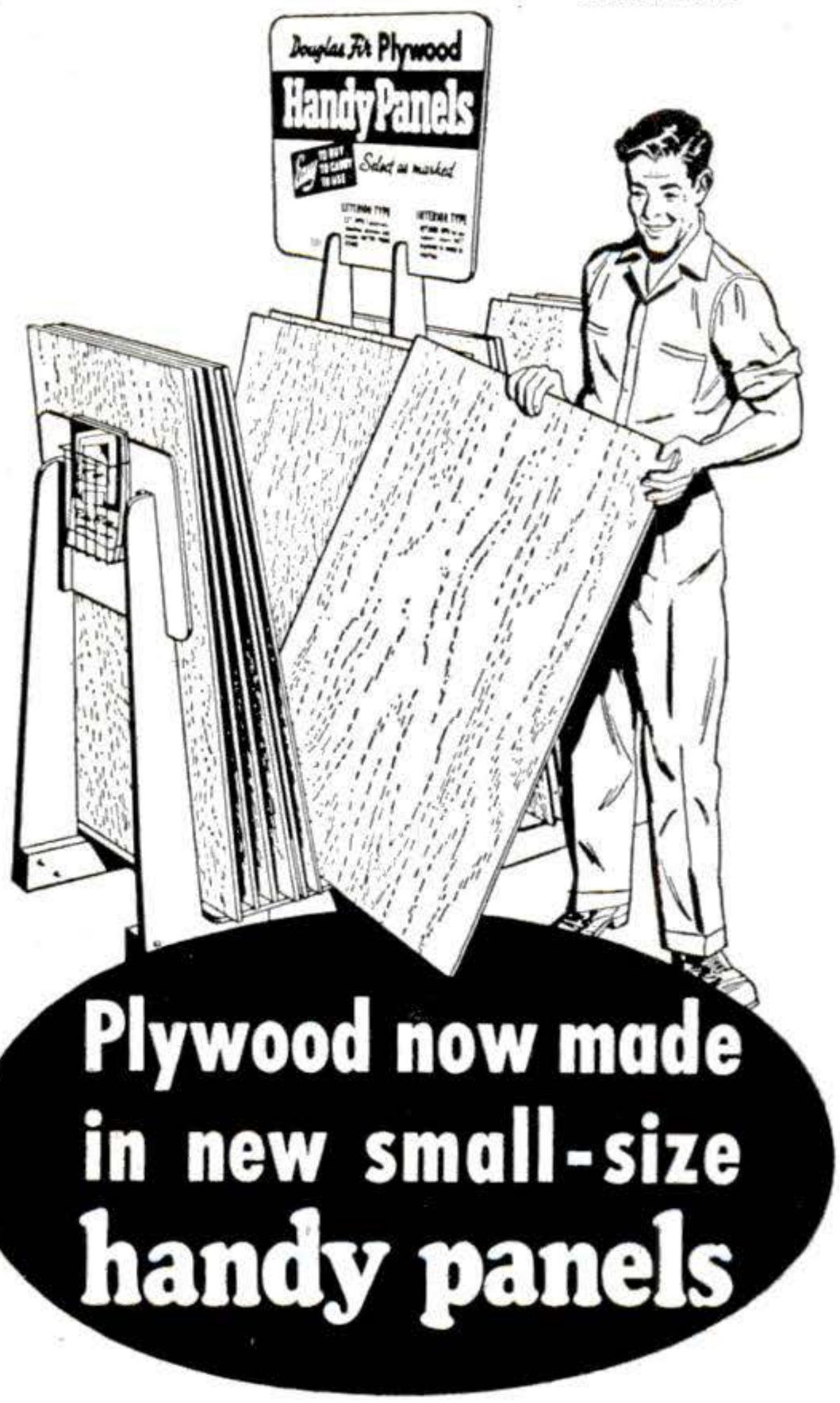
GOOD NEWS FOR WEEK-END CARPENTERS!



Plywood now made in new small-size handy panels

Now At Your Lumber Dealers In New, Self-Service Racks

Buy your plywood the easy new Handy Panel way. Easy to use because they're top-quality Douglas fir plywood . . . real wood, strong and light. Easy to carry because they come in stock sizes 2x4 feet and smaller. Popular thicknesses. Easy to select from new self-service racks at lumber dealers everywhere. Every panel clearly labeled with type, grade and price. Pick up your plywood today—the economical Handy Panel way.

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handy panels

MAIL COUPON FOR VALUABLE FREE FOLDERS

Douglas Fir Plywood Association, Dept. 12A, Tacoma, Wash.

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[*Continued from page 117*]

efficiency. One man, for instance, bolts down washing machines. Another man makes the water connections.

Lavish use is made of labor-saving machinery, some of which is unique. Excavating for concrete-slab footings is done by a scaled-down ditchdigger which chews out a rectangular six-inch trench, three feet deep, in 23 minutes. A miniature bulldozer grades the floor area within the ring. A float machine smoothes the slab surface in minutes—hand troweling would take hours.

No Two Look Alike

Precut and predrilled materials are loaded by fork lifts and dropped by truck in double bundles between pairs of houses on a synchronized schedule. The pieces needed first are packaged on top. Workmen get what amounts to a foolproof house-building kit of machine-fitted parts that "it would take a genius to put together wrong."

You can stand anywhere in Levittown, Pa., and not see two houses that look exactly alike. Seven handsome exterior color combinations are repeated in series—weathered black, heather green, autumn brown, red, gray, yellow and blue-gray. Four variations in front and roof elevations, achieved by rearranging windows, doors and carport-storage room, are also used in sequence. Moreover, the house is designed for eye appeal from every side, which enables it to sit alternately lengthwise and crosswise on the 70-by-100-foot plots, and thus break up the "row" look.

Every house does look exactly like the one 56 houses away, but you can't see that far. And besides, the streets are winding so that each house is viewed from a different perspective. In addition, each lot gets a $500 landscaping job of 13 trees and 43 assorted shrubs, bushes and vines, rotated in several patterns.

Another neat optical illusion has been accomplished indoors, where every house looks bigger than it does on the outside. A thousand feet of floor space is made to

[*Continued on page 260*]

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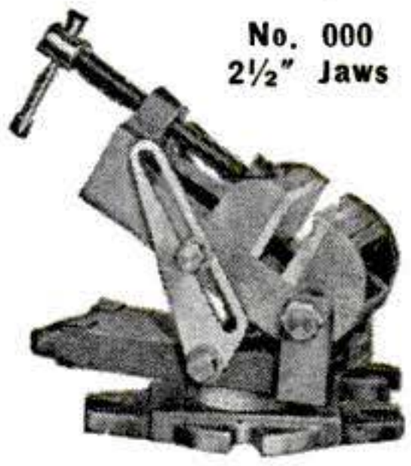
PALMGREN HOBB-E TOOLS

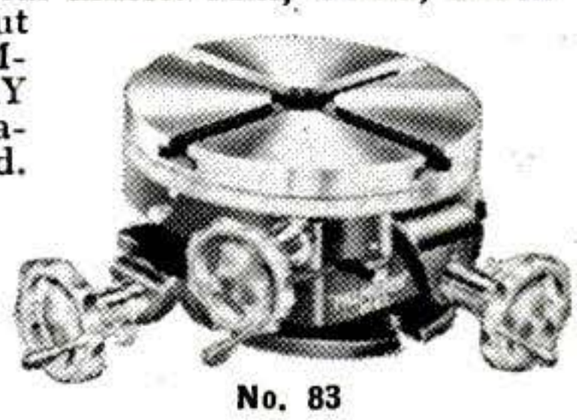
ANGLE VISE

Set up hard angle jobs in 5 seconds. Drill, grind, mill, round, square or irregular pieces quickly and accurately. Save time, money and errors. PALMGREN ANGLE VISE has 2½" Jaws, 1 Plain, 1 Grooved. Accurately machined and graduated. No. 000 only **$8.75**
Swivel Base **$3.00**


No. 000 2½" Jaws

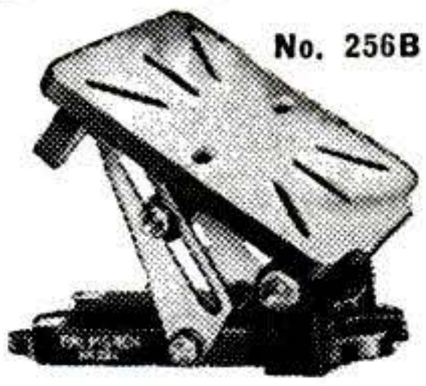
ROTARY INDEX MILLING TABLE

Turn drill press into vertical miller. Mill, Grind, Index Rabbet, Mortise and Rout curved or straight PALMGREN "Hobb-E" ROTARY TABLE is a precision machine, accurately graduated. Bolts to table.
No. 83—8" Table 4" Cross Feeds, 360° Rotary Feed **$54.50**
No. 82—Without Rotary Feed.... **$39.75**


No. 83

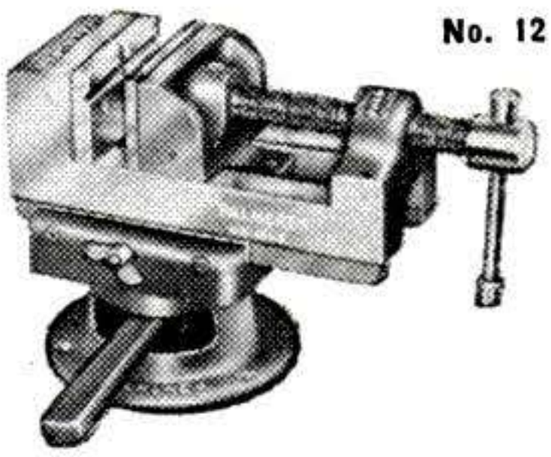
ADJUSTABLE ANGLE PLATE

Every Hobbyist should have one for jobs difficult to hold in vise. No delay, less spoilage on complicated angles in drilling, milling, grinding or layout work. No. 256 B has 6" x 6" surface plate, 8 bolt slots. Adjustable to full 90°. Accurate graduations. Swivel Base. Only **$14.35**


No. 256B

BENCH DRILL PRESS VISE

A fine "Hobb-E" tool. Base bolts to work bench for general work. Vise is dovetailed and removable for use on drill press by loosening thumb screw. Unit rotates 360° horizontally. Adapter has steel jib which locks vise in position. No. 12 Removable Jaws 2½" wide. 1 Plain 1 Grooved. Only..... **$12.95**


No. 12

ALL PURPOSE ALUMINUM HAND VISE

This "Hobb-E" tool grips small pieces for grinding, buffing and 101 other uses. Safe-guards hands and fingers. Small parts easier and faster to handle with better results. No. 15 Jaws 1½" accurately machined, can't mar work. Only..... **$2.15**

No. 15

ORDER NOW! SEND COUPON TODAY!

CHICAGO TOOL & ENGINEERING CO.,
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Enclosed find_____for items checked below.
☐ PALMGREN "Hobb-E" ANGLE VISE. ☐ PALMGREN "Hobb-E" ANGLE PLATE. ☐ PALMGREN "Hobb-E" MILLING TABLE. ☐ PALMGREN "Hobb-E" HAND VISE. ☐ PALMGREN "Hobb-E" BENCH DRILL PRESS VISE. ☐ Send Circular.

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Ready-Made City Will House 70,000

[Continued from page 258]

look and feel much larger by the unity of background color, picture windows, and an open plan of kitchen, dining area and living room around the fireplace.

The kitchen can be closed off with a flexible wood screen on a ceiling track, and a 9½-foot section of the 27½-foot living room is instantly convertible to a third bedroom by a new kind of disappearing, sliding wall. Furniture arrangement in the bedrooms is made much easier by corner doors and the absence of radiators, closet doors and low windows. High windows, for privacy, have translucent panes that slide sideways.

Levittown's 5,200-acre tract will be divided into eight master blocks by 140-foot highways. These variously shaped blocks of less than a square mile each contain three or four neighborhoods of 500 to 700 homes. Every neighborhood is circled by a drive that meets a through highway at only one point. No homes front on the through-traffic lanes.

Stores, Churches and Swimming Pools

Eight free swimming pools and recreation areas will be located near school sites, and the Levitts donate church sites and a completed $300,000 community center with full stage, currently in use as the company's administration building. Provision is made for a shopping center with a 5,000-car parking area (expected to do an $80,000,000-a-year business), public parks and picnic grounds in natural wooded locations, and a lake converted from what is now a very busy sand-and-gravel pit.

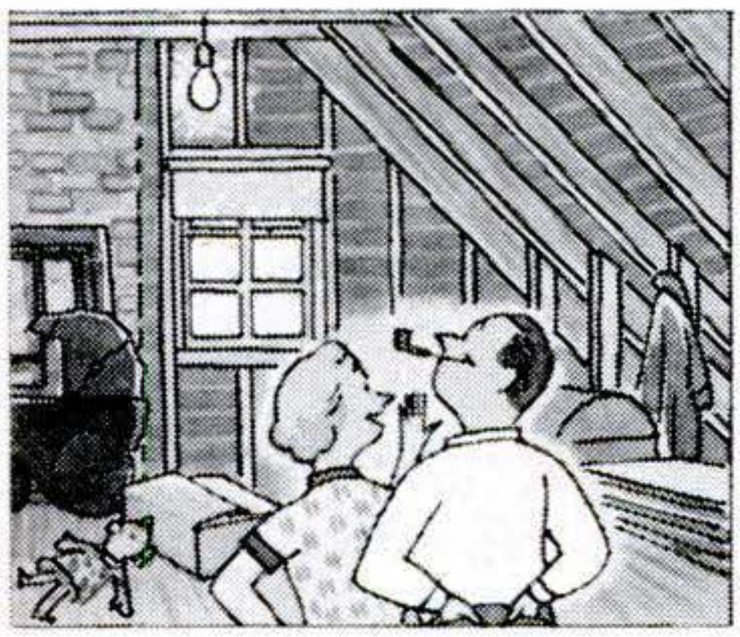
Levitt owns timber stands and a mill—that cuts lumber costs 30 percent. Then, the firm's mass buying power makes it possible to save money by buying some items direct from the manufacturers. This also stimulates the development of new products that do a job cheaper, faster and better.

For instance, Alfred and Bill have long been partial to York-Shipley's compact heating unit because housing it in the

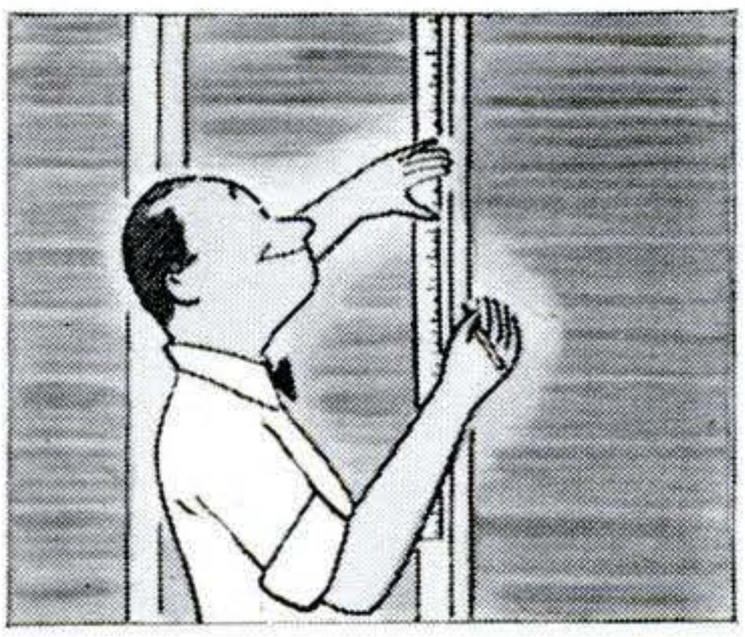
[Continued on page 262]

HOW TO "TRADE-IN" YOUR OLD ATTIC!

It's easy with Gold Bond Insulation Board!

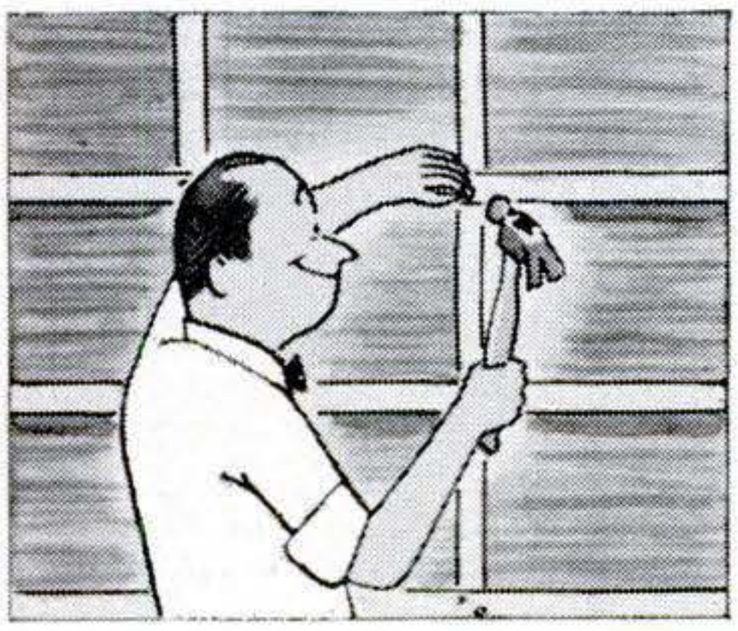


Clear the decks for action! Find someplace else for all the trunks and "heirlooms" that are cluttering up your future attic room.

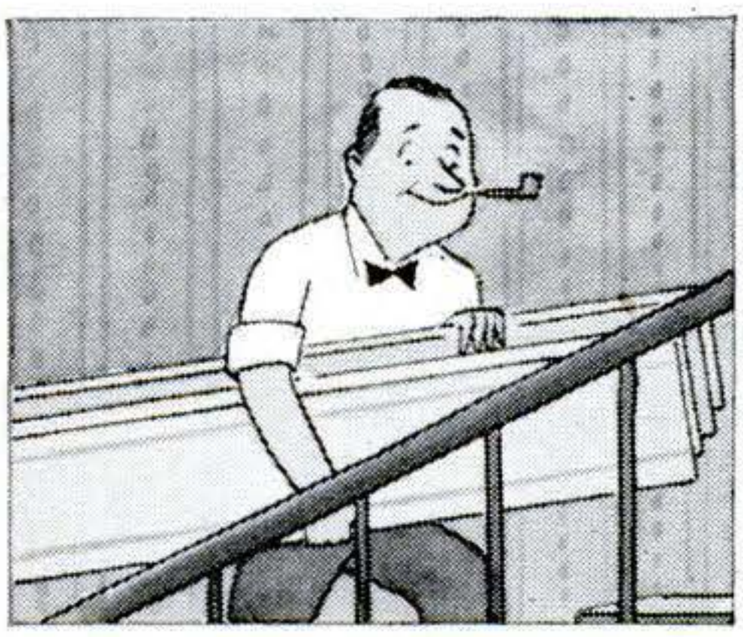


Measure attic walls and ceilings. This will tell you how much material you'll need...also determines where to nail furring strips.

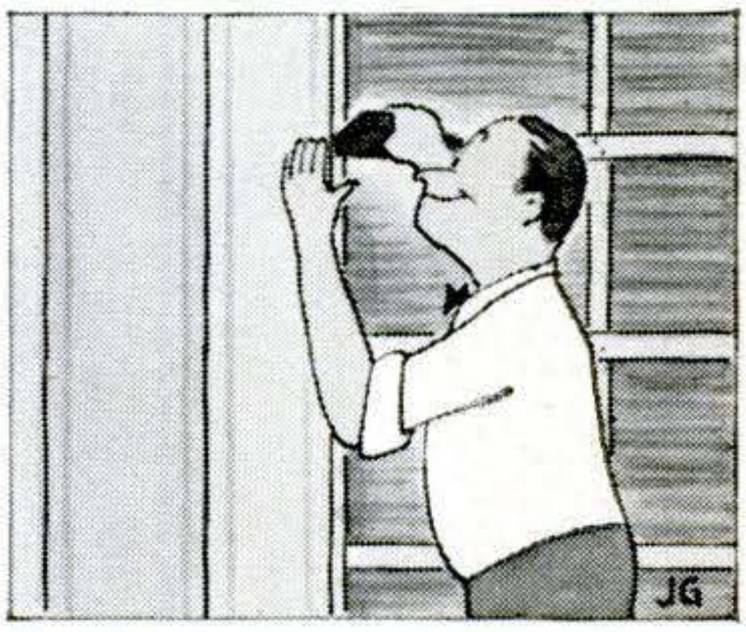
Take measurements to your Gold Bond Dealer. He'll show you factory-finished Gold Bond Insulation Plank and Tile in harmonizing colors.



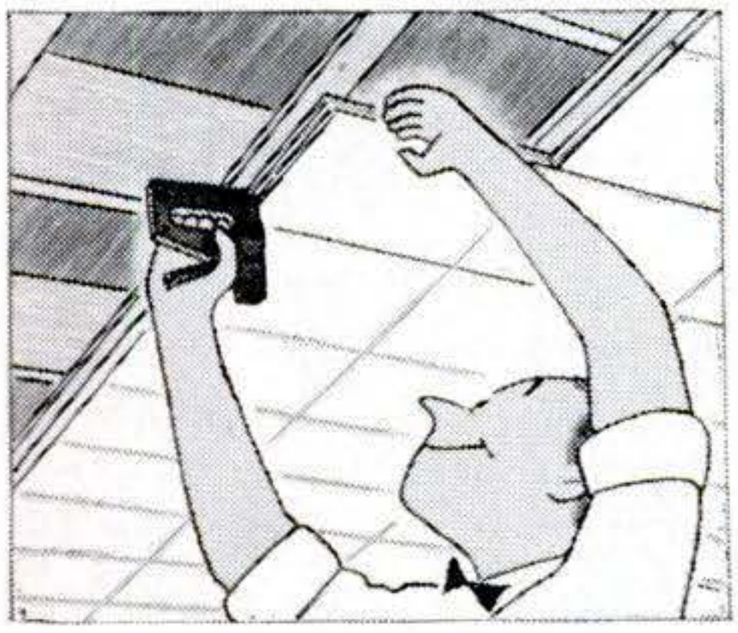
Nail up furring strips—ordinary 1" x 3" wood strips that anybody can handle. This gives you a stapling surface for Gold Bond Plank and Tile.



Gold Bond Insulation Plank and Tile are lightweight. The Plank comes in four widths starting at 8". The tile is packaged in several sizes.



Interlocking beveled edges fit together quickly and easily — hide staples or nails to give a neat, good-looking job.



Even the ceiling job is a cinch... when you use Gold Bond Insulation Tiles. There's no heavy lifting—anyone can do it.

Before you know it, a brand-new room! Pre-painted Gold Bond Insulation Board builds and decorates—*insulates* and *quiets noise*, too.

ADD-A-ROOM NOW!
with Gold Bond

NATIONAL GYPSUM COMPANY
BUFFALO 2, NEW YORK

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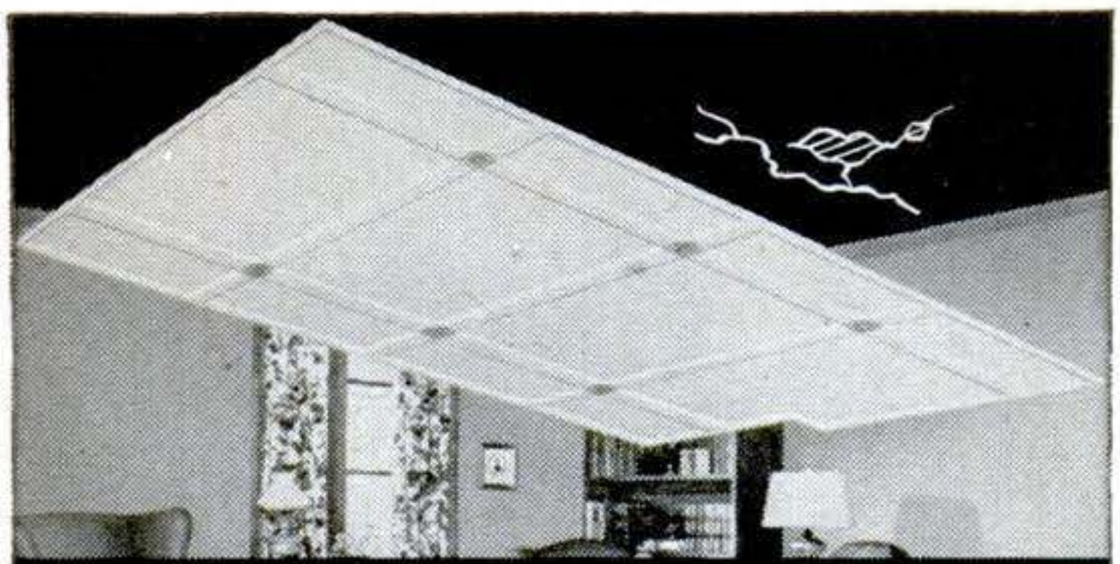


CEILINGS CRACKED?
NEED MORE ROOM?
WANT TO Modernize YOUR HOME?

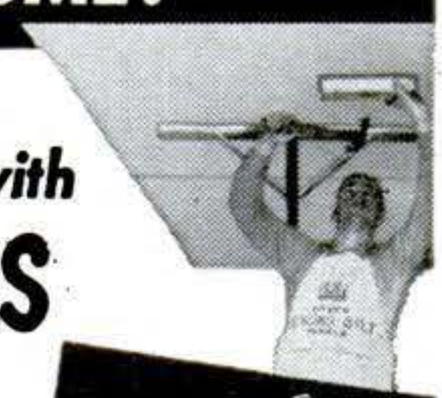
Do the job easily, quickly at low cost with

UPSON PANELS

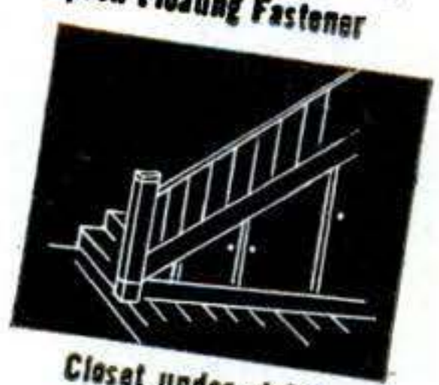
or CEILING TILE

For Cracked Ceilings: No messy replastering! No ordeal of housecleaning! Apply **Upson Kuver-Krak Panels** on furring strips right over old plaster. Unique floating fasteners eliminate face nailing. Waterproofed and washable, **Upson Ceiling Tiles** are 12-in. sq., applied with matching color pins! Both give you a beautiful new crackproof ceiling in a matter of hours!

For Modernization: Upson Panels saw like wood. Take screws, nails, fixtures. Available in a variety of widths, thicknesses and surfaces—at your lumber dealers! **Strong-Bilt Panels** for new construction, 3/16" panels for lighter work. Pebbled or smooth surfaces—plus new **Striated Panels** for a modern look! Trademarked for uses.



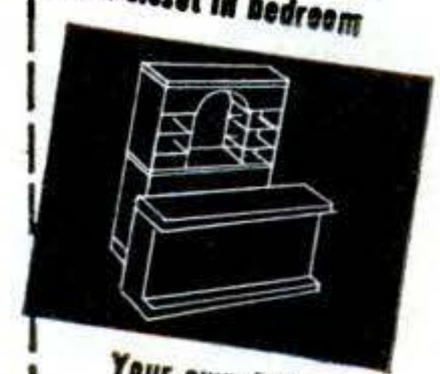
Upson Floating Fastener



Closet under stairs

Beautify your fireplace

Extra closet in bedroom



Your own bar

THE UPSON COMPANY
31011 Upson Point, Lockport, N.Y.
I enclose 10c for 32 page Idea Booklet. Include Instruction Sheet for applying Upson Ceilings and working drawings for Storage Wall FREE.

Name_____
Street_____
City_____
State_____

Ready-Made City Will House 70,000

[Continued from page 260]

kitchen frees perhaps $1,000 for sections of the house that will be lived in more than a cellar or a utility room. At one time the heater looked like a kitchen cabinet and hung from the ceiling. Now it sits beside the washing machine in a matching enameled case. With a stainless-steel top, the heater doubles as a hot plate—another Levitt innovation.

In an operation the size of Levitt's, asbestos-cement siding in shingle size is wasteful of material and labor. Large sheets of the same material, on the other hand, are desirable, for they make for more rigid construction. The public wasn't conditioned to accept them, however, until Alfred figured out a way to make them look like shingles. Now they're on the general market.

Low-Cost Picture Windows

Of all its contributions to construction technology, the Levitts are proudest of having made normally expensive glass walls no more costly than solid construction. The coveted picture walls are especially costly in odd sizes that call for special framing. Alfred hit on the idea of making them up in standard door-frame sizes.

The Levitts went a little overboard after this master stroke and even put a picture wall in a bedroom of the model house. But Bill shortly thought better of this and bluntly told everyone who wanted one just like it (and plenty did), "You can't have it, and two years from now you'll thank me for not letting you have it. Do you want to spend half your life pulling down shades?"

It would be almost a sacrilege for the owner of a Levitt house to be guilty of a waste motion. END

Noah Use Complaining

When Noah sailed the waters blue
He had his troubles same as you.
For 40 days he drove his ark
Before he found a place to park!

—*PIE Log*

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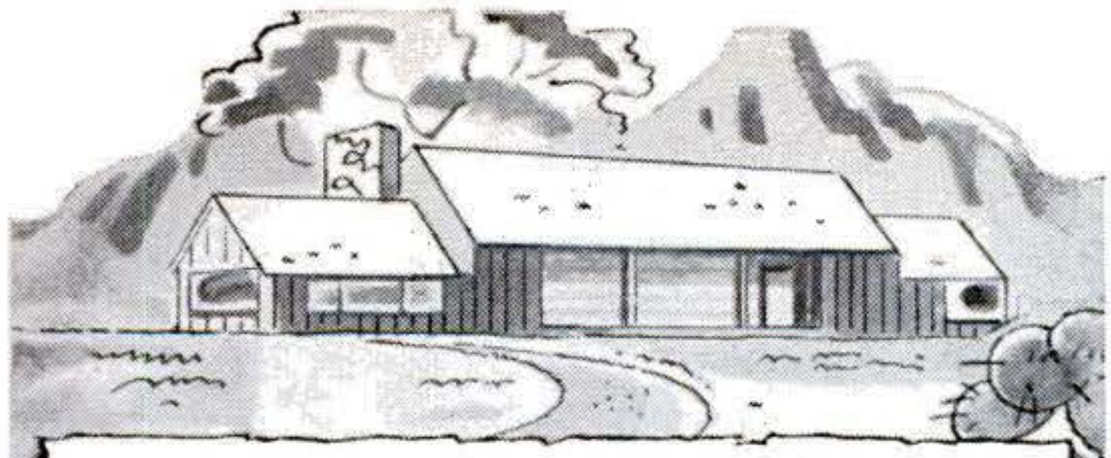


Friendly Western Colors in CABOT'S

Ranch House Hues

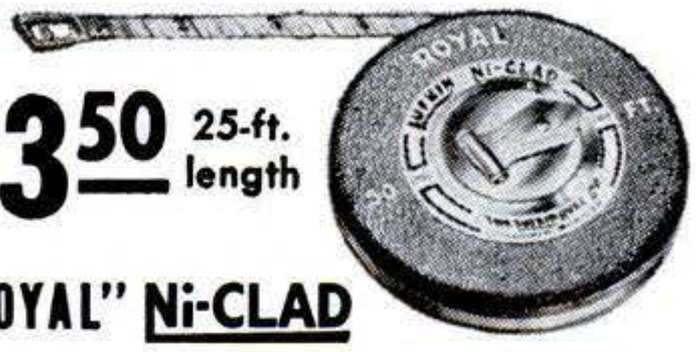
Nature's own colors, those warm, friendly tones you see in the Spanish Southwest, are faithfully reproduced in Cabot's Ranch House Hues, a unique pastel finish that enhances the texture of shingles, clapboards, siding, fence.

Ideal for new or weathered redwood, red cedar, fir, pine and other woods. Easy to apply, even for the amateur. Costs ½ as much as good paint.

Write Today for color card showing new Ranch House Hues, available from no other source — *Salinas Fawn, Mimosa Yellow, Sombrero Buff, Sagebrush Gray, Hacienda Gray, El Capitan Gray, Sequoia Red, Pipestone Red.*

SAMUEL CABOT INC.
1168 Oliver Building, Boston 9, Mass.

high quality low price



$3.50 25-ft. length

LUFKIN "ROYAL" Ni-CLAD

Your best buy in steel tapes. Dependable Lufkin quality at the lowest price. This accurate, durable, long steel tape has an all metal line of hard nickel-plated steel that resists rust and corrosion—will outwear soft-coated tapes many times. Equipped with folding hook ring. Tough, dark green vinyl cover. Your hardware store has the "Royal" Ni-Clad in 25, 50, 75, and 100 foot lengths.

BUY LUFKIN TAPES • RULES • PRECISION TOOLS at your hardware or tool store

THE LUFKIN RULE CO., SAGINAW, MICHIGAN 193
132-138 Lafayette St., New York City • Barrie, Ont.

THE LUFKIN RULE CO., Dept. PS, Saginaw, Michigan
Please send me the fascinating booklet, "The Amazing Story of Measurement." Enclosed find 10¢ (no stamps) to cover handling and mailing.

NAME_____

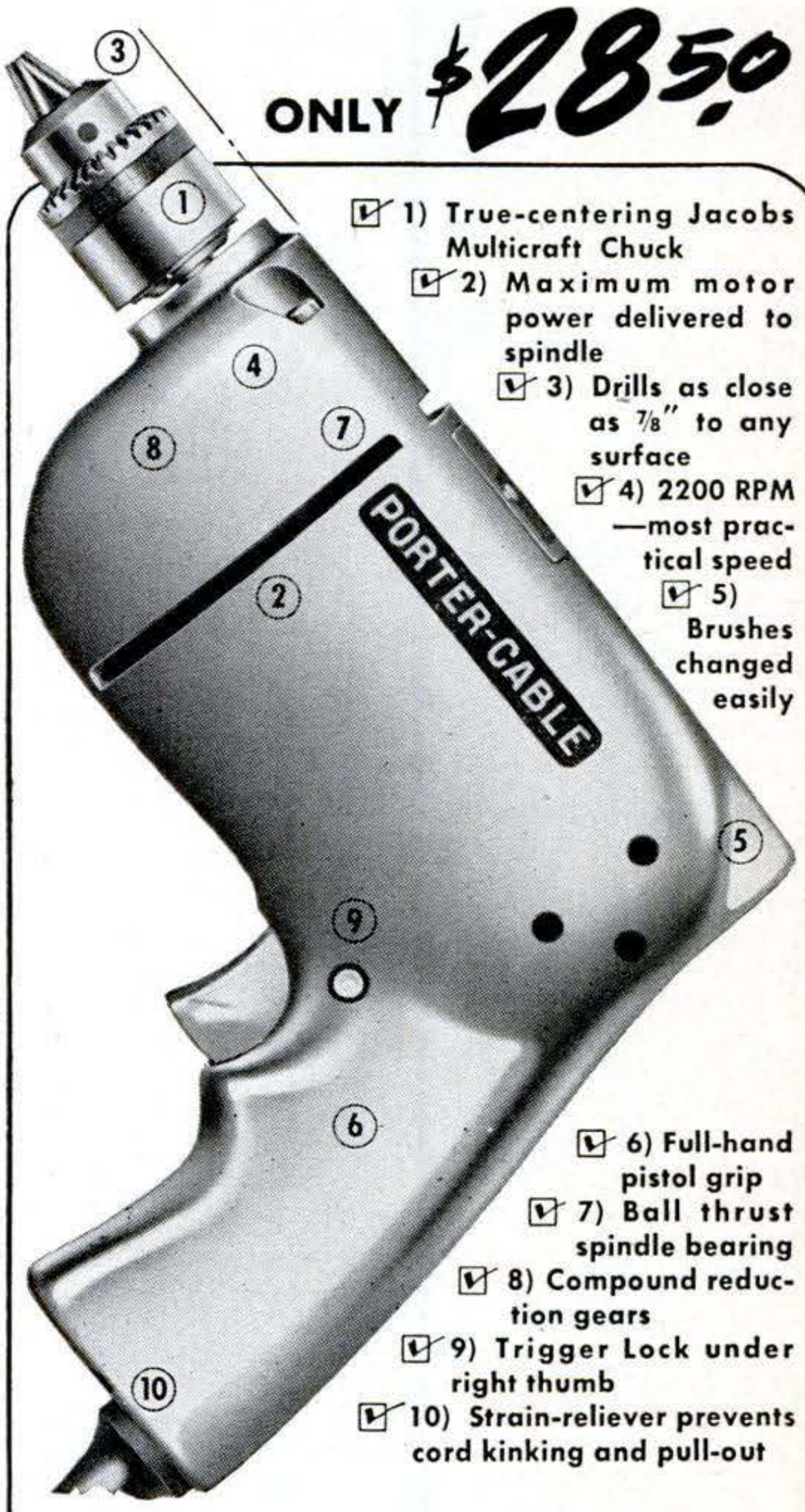
ADDRESS_____

CITY_____ STATE_____

New PORTER-CABLE Guild

High-Score ¼" DRILL

ONLY $28.50



- ☑ 1) True-centering Jacobs Multicraft Chuck
- ☑ 2) Maximum motor power delivered to spindle
- ☑ 3) Drills as close as ⅞" to any surface
- ☑ 4) 2200 RPM —most practical speed
- ☑ 5) Brushes changed easily
- ☑ 6) Full-hand pistol grip
- ☑ 7) Ball thrust spindle bearing
- ☑ 8) Compound reduction gears
- ☑ 9) Trigger Lock under right thumb
- ☑ 10) Strain-reliever prevents cord kinking and pull-out

IT TOOK 7 years of nationwide surveys and field testing to produce this drill. That's why you'll find the new Guild *scores highest* in value of all general duty drills. Every performance feature you drill users told us you wanted—every design and construction feature our engineers insisted on—is built into this truly up-to-the-minute ¼" drill. Prove what we say . . . score the Guild Drill point by point against *all* others!

AT YOUR PORTER-CABLE DEALER'S

Or write for free guide, "How to Choose a Drill," Porter-Cable Machine Co., 6191 N. Salina St., Syracuse, N. Y.

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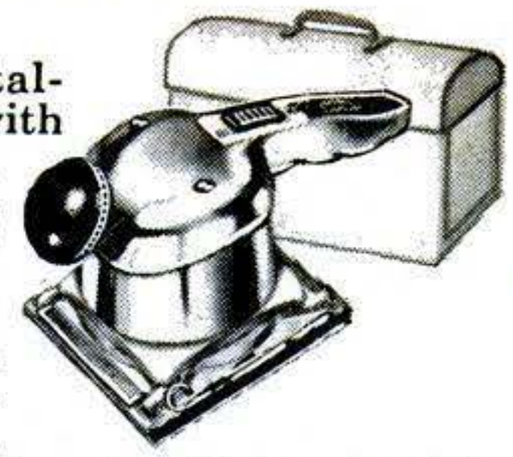
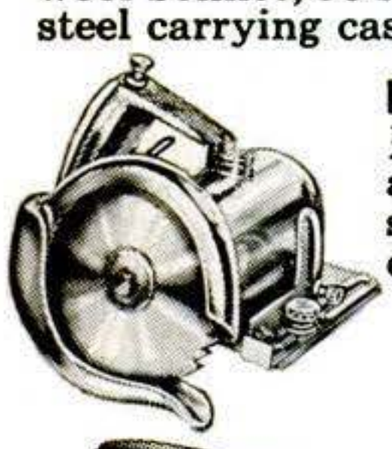
Build, repair, install, finish or refinish—at your convenience, at low cost. Powerful SpeedTools take the drudgery out of work, help you do "professional" quality work in a hurry.

No. 150 SpeedSander
An all-ball-bearing, orbital-motion, finishing sander with powerful 3450 r.p.m., A.C. induction motor and cast aluminum body. **$34.50**

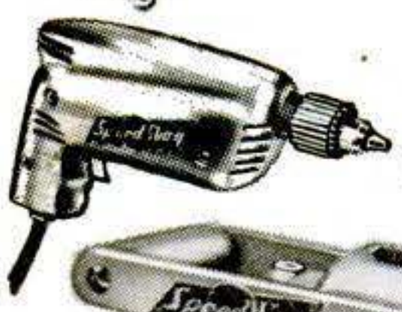


150-K SpeedSander Kit
The Sander with Accessories including: deep contour pad, finishing plate, felts for free abrasives and wet rubbing, lamb's wool bonnet, 90 sheet abrasive covers, etc. in fitted steel carrying case. **$49.50**



No. 1000 SpeedSaw
¼ H.P. Universal Motor, cast aluminum housing, safety shut-off switch. Cuts all angles to 45°, any depth to 1⅛" **$29.95**

SpeedDrills
(for metal or wood)
Extra power, high speed, electric drill with cast aluminum cases, and geared chucks.



No. 200-J ¼" SpeedDrill $19.50
No. 400 ½" SpeedDrill $39.50
also other sizes, types.

Drill Kits
Several fast selling kits. Painters and Householders Kit (illustrated) is typical. It has: ¼" Hornet Drill, Abrasive Discs and rubber backer plate, grinding wheel, wire brush, buff, etc. In attractive display carton. **$19.95**

Write for catalog

Speed Way MANUFACTURING CO.
1864 So. 52nd Ave. • Cicero 50, Illinois

1953 Kaiser "Breathes Deeper"

[*Continued from page 122*]

is shot first one way and then the other across the floor of the intake manifold. This provides ample heat for engine warm-up. Yet the neat thing about the pulse effect is that it diminishes steadily as the cylinders fire more rapidly. Consequently, at high speeds less exhaust gets to the intake manifold through those holes than used to sneak past the heat valve and bog down. This substantially reduced another source of back pressure.

I quickly found out how well the engineers had done their work when I took a 1953 Kaiser Manhattan out on the road. I had one passenger and a full gas tank.

We picked out a long, straight stretch of the Detroit Expressway and first tried accelerating from a standing start to an indicated 60 miles an hour. I used a combination of the Low and Drive ranges of the Hydra-Matic transmission, shifting at 30 miles an hour. We hit 60 in 14.6 seconds.

Pop-Out Windshield Works

Using Drive range from the start, we slid up to 60 in a flat 14 seconds. In both tests I bettered my own acceleration time with the 1952 model (PSM, May '52, p. 143) by half a second.

Two important features that have not been changed, I'm glad to say, are the pop-out windshield and rear window.

Around the plant, they tell with pride the story of the employee and his wife whose Kaiser was struck diagonally by another car traveling 60 miles an hour. The Kaiser tooka nasty beating, but the driver's wife was not hurt and the driver himself got off—pretty luckily, I'd say—with a broken leg. Rescuers found both the windshield and the rear window nearby. There wasn't a crack in either of them!

END

A Car Grows Old

Jack: "I always know when a car reaches middle age."

Jill: "Just how can you tell?"

Jack: "When it doesn't want to go over 40."

—*Fireman's Fund Record*

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SURPLUS MACHINE SHOP TOOLS AT PRICES YOU CAN AFFORD

HIGH SPEED STRAIGHT SHANK DRILLS

SET 6G 30 selected H. S. Straight Shank Drills from 1/8" to 1/4", lengths up to 7". $15 value, only **$2.98**

SET 7G 12 different size H. S. Straight Shank Drills. 1/4" to 1/2", lengths up to 7", only..... **$3.98**

HIGH SPEED MORSE TAPER SHANK DRILLS

Reconditioned and sharpened—ready to go! Many drills with extra lengths of flute. Immediate delivery. These drills are priced as low as 25% of your present cost and shipped post paid to you.

Size in in.	Twist Lgth.	Price Each	Size in in.	Twist Lgth.	Price Each
1/4	2 1/2	.35	39/64	6 1/4	1.06
5/16	2 1/2	.40	5/8	4 1/2	1.06
21/64	3 1/2	.40	41/64	4	1.19
11/32	3	.43	21/32	6	1.19
23/64	3	.48	43/64	4 1/2	1.31
3/8	3 1/2	.48	11/16	4 1/2	1.31
25/64	3 1/2	.53	45/64	4 3/4	1.44
13/32	3	.53	23/32	5	1.44
27/64	3 1/2	.55	47/64	5	1.57
7/16	3 1/2	.55	3/4	5	1.57
29/64	3 3/4	.63	49/64	4 1/4	1.64
15/32	3 1/2	.63	25/32	4 3/4	1.64
31/64	3 1/2	.65	51/64	5 1/2	1.85
1/2	4	.75	13/16	4	1.85
33/64	4	.82	53/64	4	1.91
17/32	4	.82	27/32	5 1/2	1.91
35/64	4 1/4	.90	55/64	5 1/2	2.02
9/16	4 1/4	.90	7/8	4 1/2	2.02
37/64	6 1/4	1.00	57/64	5 1/4	2.12
19/32	4 1/4	1.00	29/32	4 3/4	2.20
15/16	5 1/4	2.20	1-25/64	7	5.75
61/64	4 1/2	2.42	1-13/32	6	5.80
31/32	4 3/4	1.50	1-27/64	5	5.80
63/64	5	2.50	1-7/16	6	6.00
1	5 1/2	2.60	1-29/64	6	5.80
1-1/64	6 1/2	2.60	1-15/32	8	6.13
1-1/32	6	2.76	1-17/32	7	7.16
1-3/64	8	2.82	1-35/64	8	7.25
1-1/16	7 1/4	2.82	1-9/16	10 1/2	7.50
1-5/64	7 3/4	3.00	1-37/64	6 1/2	7.25
1-3/32	6	3.33	1-19/32	8 1/2	7.75
1-7/64	9	4.00	1-39/64	7	7.75
1-7/64	18 1/2	8.50	1 5/8	8 1/2	8.50
1 1/8	8 1/2	4.00	1-21/32	7	8.00
1-9/64	7	3.75	1 3/4	5	6.00
1-5/32	6 1/2	3.80	1-27/32	7 1/2	11.00
1-11/64	7 3/4	3.95	1 7/8	9	11.90
1-3/16	7 1/2	3.95	1-29/32	6 1/2	12.00
1-13/64	7	3.25	1-15/16	11	12.95
1-7/32	8 1/2	3.70	1-31/32	7 1/2	10.00
1-15/64	7 1/2	4.51	2 1/4	10 3/4	17.50
1 1/4	6 1/2	4.75	2-9/32	7 1/4	16.00
1-17/64	6	4.75	2-5/16	7	16.25
1-9/32	7 1/2	5.00	2-7/16	11	21.50
1-19/64	5 1/2	5.10	2-15/32	13	23.50
1-5/16	5 1/2	5.18	2 1/2	11	25.00
1-21/64	5 1/2	5.38	2 7/8	10	25.00
1-11/32	9 1/2	5.38	2-29/32	12	27.50
1 3/8	5 1/2	5.55	4	9	34.50

Large quantities available in every size. 5% DISCOUNT ON PURCHASES OF $50 OR MORE. 10% DISCOUNT ON PURCHASES OF $100 OR MORE.

1/4" TO 17/32" BITS — 1/4" SHANKS
1/2" TO 1-3/16" BITS — 1/2" SHANKS
All Bits High Speed.

Add 10% to the price of any of the above Bits from 1/4" to 17/32" and you can have a 1/4" straight shank to fit your 1/4" Drill. Add 10% to price of any above Bits from 1/2" to 1-3/16" and you can have a 1/2" straight shank to fit your 1/2" Drill.

H. S. TAPER SHANK CHUCKING REAMERS

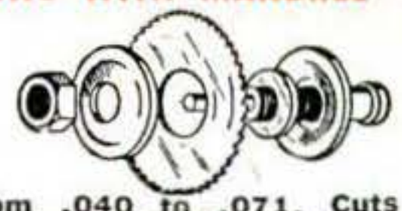
SET 25G 15 Different Size High Speed Morse Taper Shank Chucking Reamers up to 1/2" with No. 1 and 2 tapers. New and used. Priced at only..... **$7.95**

SET 13G 8 Different Size High Speed Morse Taper Shank Chucking Reamers from 1/4" to 1". New and used. Priced at only.. **$6.95**

HIGH SPEED WOODRUFF KEY SEAT CUTTER

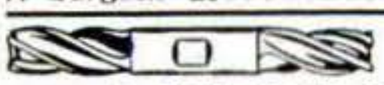
SET 4G 5 different size cutters. Can be used as mounted milling cutter or circular saw. All with 3/8" and 1/2" shanks, widths up to 1/4", dia. up to 1". New and used. Ppd. Priced at only.... **$3.95**

6 SLITTING SAWS WITH MANDREL



SET 34G 6 Different Size High Speed Slitting Saws, 5 pcs. 2 3/4" dia. x 1" arbor, plus 1 pc. 5" dia. x 1/2" arbor—thickness from .040 to .071. Cuts wood, aluminum, brass, steel, etc. PLUS SPECIAL MANDREL which enables use of saws in 1/4" or 1/2" elec. drill. $25 value. PPD. Only..... **$4.95**

7 selected, sharp H. S. Slitting Saws as above to use on your own mandrel or milling machine. New and used. PPD. A bargain at..... **$4.95**



DOUBLE-END END MILLS

SET 29G 4 right hand H. S., 3/8" straight shank End Mills up to 3/8" dia. **$3.98**

NEW ROTARY FILE MIX

7 different pcs., High Speed 1/4" shank, PPD. . **$4.49**

SET 22G 14 different pcs. as above, PPD. **$8.79**

HIGH SPEED HAND TAPS

SET 1G 8 different size H. S. Std. Thread Hand Taps up to 5/8", including 2 Std. H. S. Pipe Taps. $2.95

SET 40G 16 same as above...$4.80

NEW 360° SWIVEL TYPE TOOL HOLDER & BORING BAR

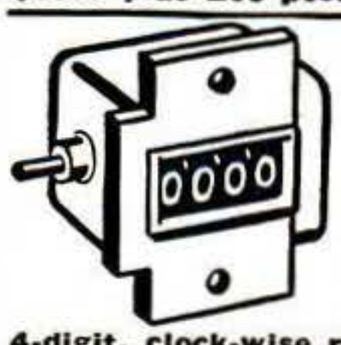
Here is a tool that will do the work of a left, right and straight tool holder, plus a boring bar, all for a fraction of its original cost. PPD to you.

- TOOL A takes a 5/16" sq. bit or 5/16" dia. boring tool. Shank size 9/16"x1"x4 3/4". PPD. Only..... **$3.29**
- TOOL B takes a 3/8" sq. bit or 3/8" dia. boring tool. Shank size 5/8"x 1-3/16"x5 3/4". PPD. Only..... **$3.95**
- TOOL C. Cut-off blade holder for 3/32"x 3/8" blade. Shank size 1/2"x1"x4 1/2" (can be changed to fit other size cut-off blades). PPD. Only..... **$2.25**
- TOOL BIT SPECIAL: 12 H. S. 3/16" sq. x 2 1/2" new tool bits. PPD..... **$1.95**

NEW HAND TOOL BARGAINS!

A must for you at this low price!

- 17-pc. 1/2" DRIVE SOCKET SET: contains flex handle; sliding T; speeder handle; U-joint; and 12 sockets to 1", only .....$7.50 plus 85c postage
- 14-pc. 3/8" DRIVE SOCKET SET: contains ratchet; sliding T; speed handles; flex handles; 3 extensions; 7 sockets to 3/4", only.....$6.95 plus 50c postage
- 10-pc. HEAVY DUTY BOX END-WRENCH SETS: size range 5/8" to 1 1/2". A wonderful new surplus buy at $6.75 plus 1.00 postage.
- 7" DIAGONAL PLIERS, PPD.....$1.85
- 8" NEEDLE NOSE PLIERS, PPD. $1.35
- NEST OF SAWS: contains 5 saws.... $1.95 plus 35c postage.
- 6", 8", and 10" Adjustable WRENCH SET: polished heads. In plastic kit..... $3.00 plus 20c postage.



NEW VEEDER ROOT COUNTERS

(non-reset type)

A counter for punch presses, motor RPM, gadget experimentation, etc. 3 digit, clock-wise rotation type..... **$1.49**

4-digit, clock-wise rotation type ...$1.89
5-digit, clock-wise rotation type ...$2.49
5-digit ratchet type $2.89

10 TO 1 GEAR BOX

Worm gear drive, throw-out type clutch, ball-bearing throughout. 1/2" drive spline, 3 1/4" output gear. Wt. 6 lbs. Rated up to 6 H.P., only..... **$8.95**

HYDRAULIC BARGAIN DEPT.

- Any length
- Std. Pipe Connections

1/4", 3/8", and 1/2" ID Available
1/4" hose has 1/4" male pipe connections.
3/8" hose has 3/8" male pipe connections.
1/2" hose has 1/2" male pipe connections.

Length in feet	Price 1/4" ID	Price 3/8" ID	Price 1/2" ID
1	$ .75	$1.50	$1.65
2	1.00	2.25	2.40
3	1.20	2.75	2.95
4	1.45	2.95	3.10
5	1.70	3.40	3.60
6	1.95	3.60	3.75
7	2.30	3.75	3.95
8	2.55	3.95	4.10
9	2.80	4.25	4.40
10	3.00	4.50	4.65

11 to 50-ft. lengths available at 20c per ft. for 1/4" ID Hose—40c per ft. for 3/8" ID Hose—45c per ft. for 1/2" ID Hose. Above prices quoted complete with fittings. Finest construction double wire internal braid. 1/4" ID Hose will carry 3 GPM at 1000 PSI. Large quantities available at greatly discounted prices.

PESCO HYDRAULIC GEAR TYPE PUMP

Rated at 3 GPM, 3750 RPM, 1500 PSI. 1/2" drive spline. Gov't cost over $90. Yours for only..... **$9.49**

PUMP AND MOTOR

Pump has 1" connections, built-in relief valve, adjustable up to 1500 lbs. Max. capacity 6 GPM. 1 1/2 H.P., 24-volt motor, 4000 RPM. Can be used on 12 or 36 volts. 500 units available at quantity discounts. Wt. 20 lbs. CLOSE OUT AT.... **$9.98**

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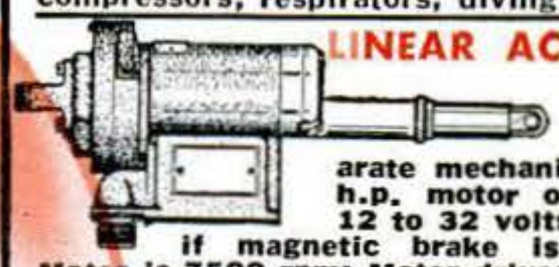
- A4 Tank, 5" x 8". 104 cu. in. vol. 500 PSI $1.50
- D2 Tank, 6 1/2" x 24". 500 cu. in. vol. 500 PSI $4.25
- Demand Type Regulator complete with 500 PSI pressure gauge. Fits above tanks $1.50
- Mask complete with 14" of hose. Outlet valve. Fits above regulator.....$1.60

Above equipment suitable for air tanks, compressors, respirators, diving units, etc.

LINEAR ACTUATOR



This unit contains three separate mechanisms; a 1/8 h.p. motor operates on 12 to 32 volts DC or AC if magnetic brake is removed. Motor is 7500 rpm; Motor drives ball bearing 120-1 gear box, which operates precision ground screw to give 5 1/8" push or pull. Pulls up to 1750# and pushes up to 850#. Unit has automatic electric switches which cut the motor when fully extended or fully closed, thus preventing harm to unit. Can be used for valve operation, window or door operation, etc. Unit wt. 7 lbs. Govt. cost over $200. This unit is yours for only $9.95 PPD.

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- 2—8" WIRE WHEELS coarse and fine, 1" thick, 5/8" bore. Pair only.....$2.29
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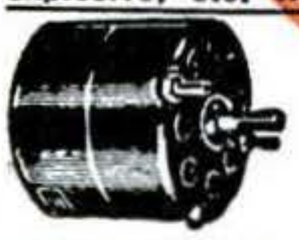

1/20 H.P., 110-VOLT MOTOR: 60 cycle A.C. 1550 RPM bronze bush bearing. 5/16" shaft. Used, guaranteed serviceable. Wt. 4 lbs. Only..... **$2.49**

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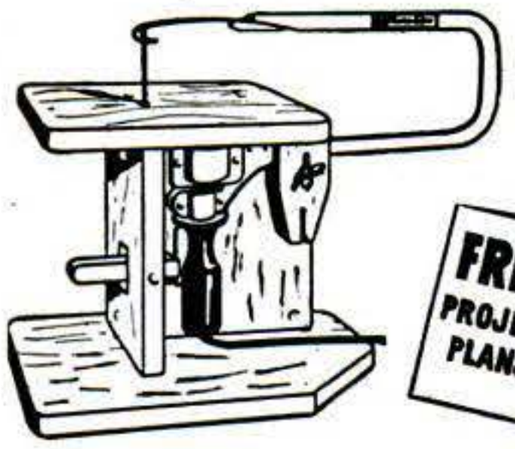

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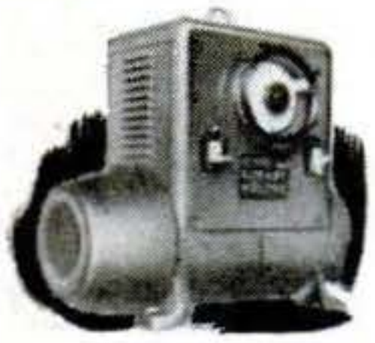

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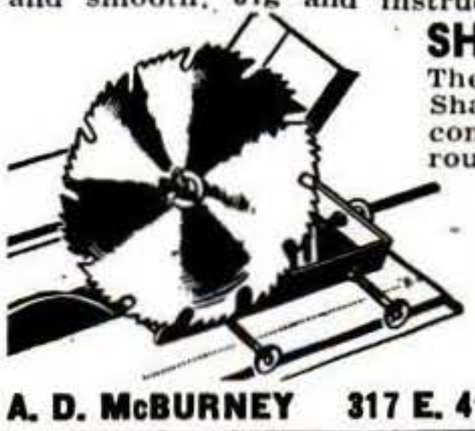

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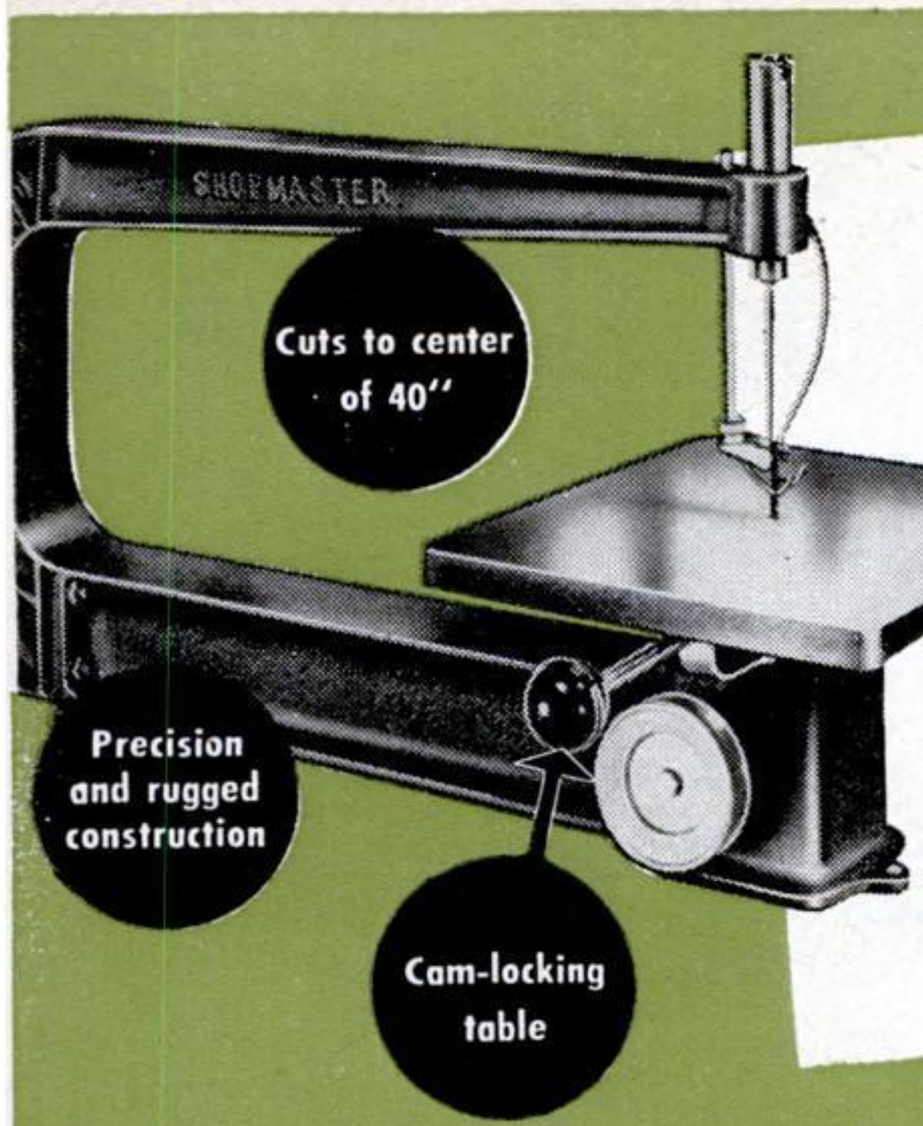

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at these LOW Combination PRICES

2-8" Saws $6.10
(1 No. 60 and 1 Planer)

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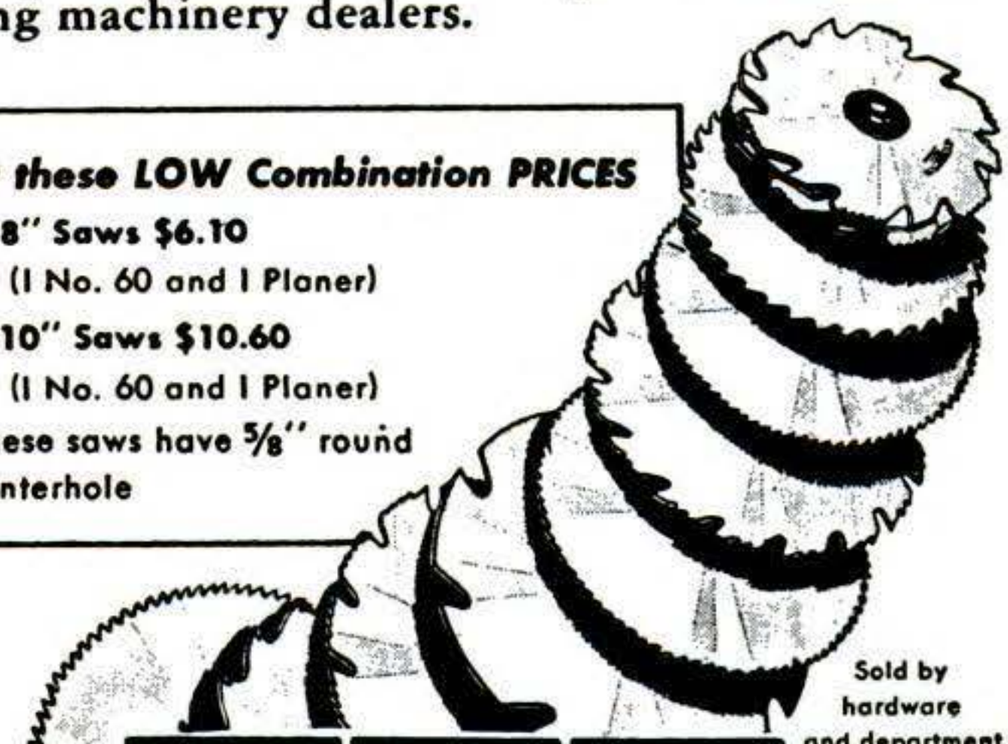
These saws have 5/8" round centerhole



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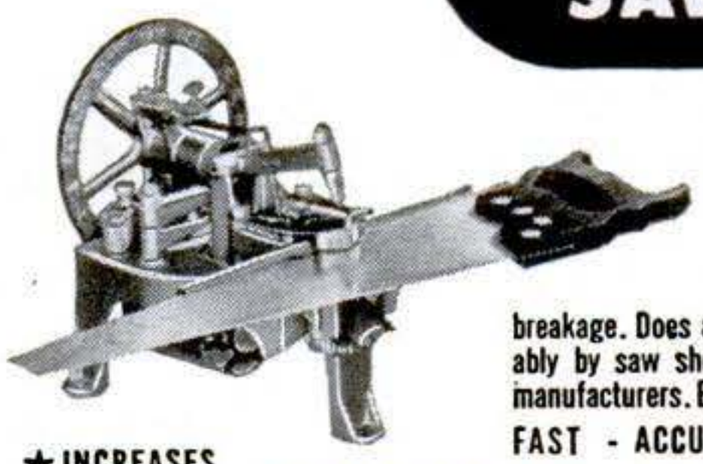

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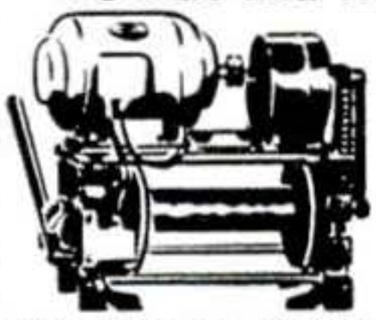

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Ball bearing Hand winch, low ratio 1-1, high ratio 3-1, 600 lb. pull.....**$29.50**

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½ HP, electric ball bearing model; releasing brake starts motor, brake on-motor off; compact gear box, 12 rpm drum speed..**$135.00**

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Heavy duty, 10-1 ratio, double drum model with jaw-type clutch, wgt. 280 lbs. **$49.95**

CABLE, ¼" preformed stainless steel aircraft, 100 ft. or less.....**17¢/ft.**

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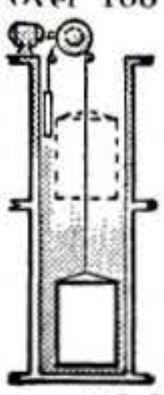

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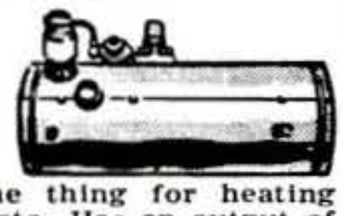

Warms up fast—just the thing for heating trucks, buses, garages, etc. Has an output of 50,000 BTU's per hr. 24 volts DC. Length 23", diameter 13", weight 14 lbs. Original cost $130. Our special sale price, NEW. Only **$19.95**

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(Nothing less than 50 ft.)

4 Wire #18 Neoprene standard, per ft. **7c**
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Long wearing GOODRICH 2 ply 2" I.D., 25 ft. lengths worth $25. Only **$4.95;** 3 lengths for **$12.00**

SAVE OVER 50%

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BE PREPARED for any emergency!

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2000-2500 WATT 110 volt AC, 60 cycle, slow speed generator, 5.10 HP Briggs & Stratton gas engine, NEW..... **$294.50**

To make 110-220 add $40, for transformer.

2500-3000 WATT 110 volt AC, 60 cycle, Leland generator—runs at slow speed (1800 r.p.m.) for longer life, 8.25 HP Briggs & Stratton gas engine. You can rely on this plant for all average home needs—freezer, stoker, pump, hot plate, radio, etc. —and overloads from starting motors. Reconditioned and fully guaranteed.....**$295.00.**

NEW **$345.00**

Plants same as above, built in 1951, with tools and spare parts. Lists at $790. Our price **$426.** To make 110-220 add $48 for transformer.

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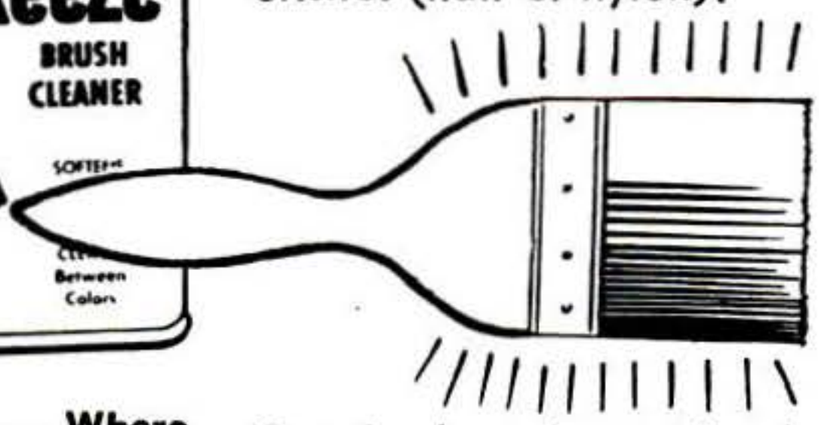

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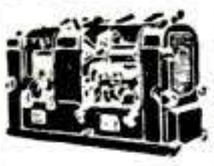
POWER PLANTS and GENERATORS



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● **Homelite Plants.** 1.5KW, 115-v, 60-c. Special **$199.50**

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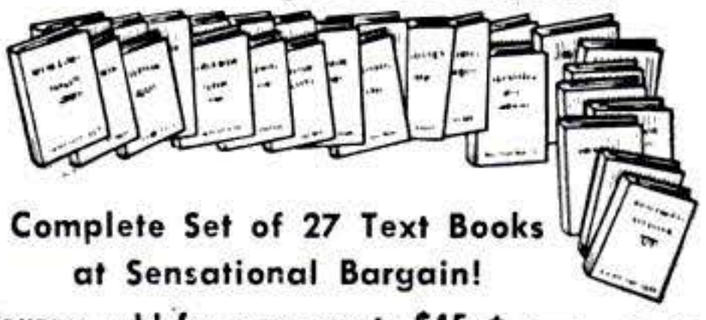

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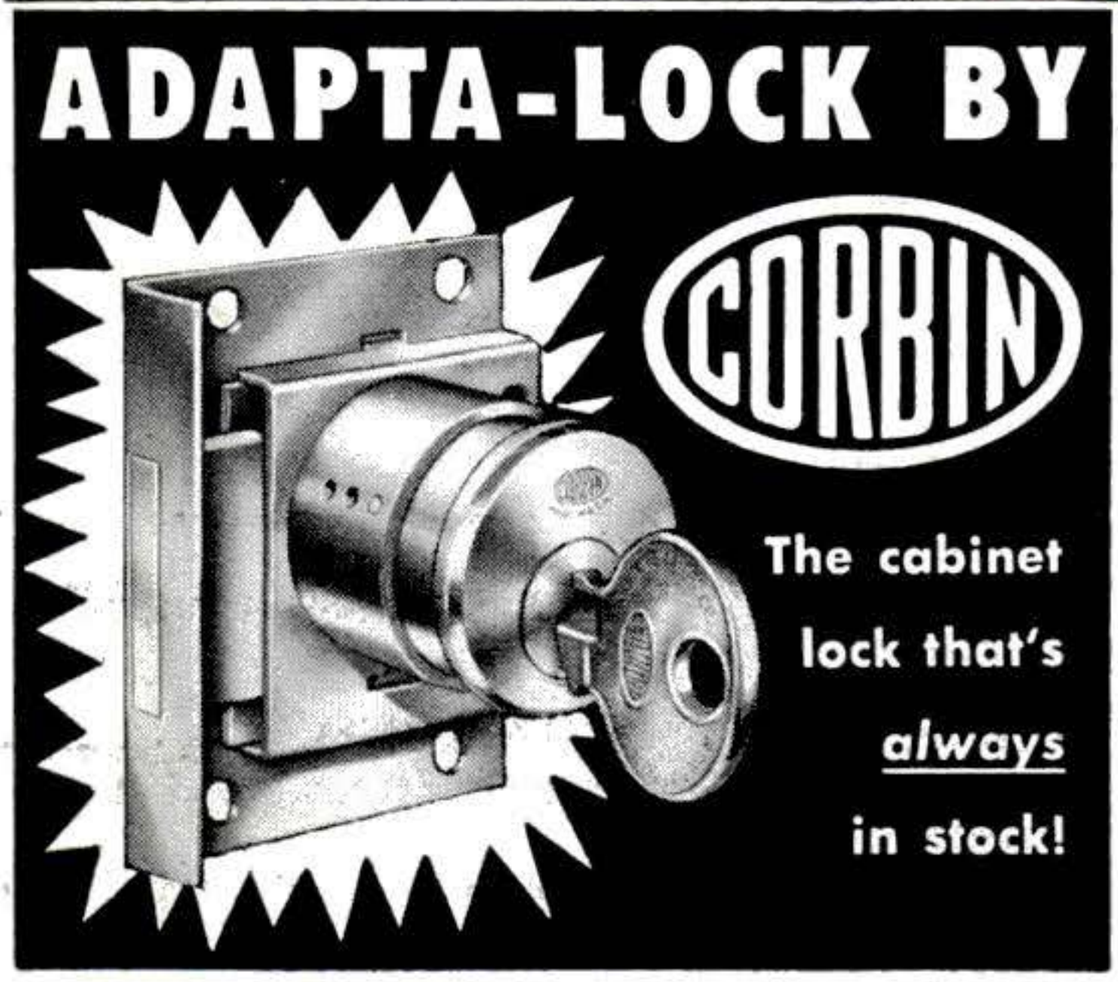

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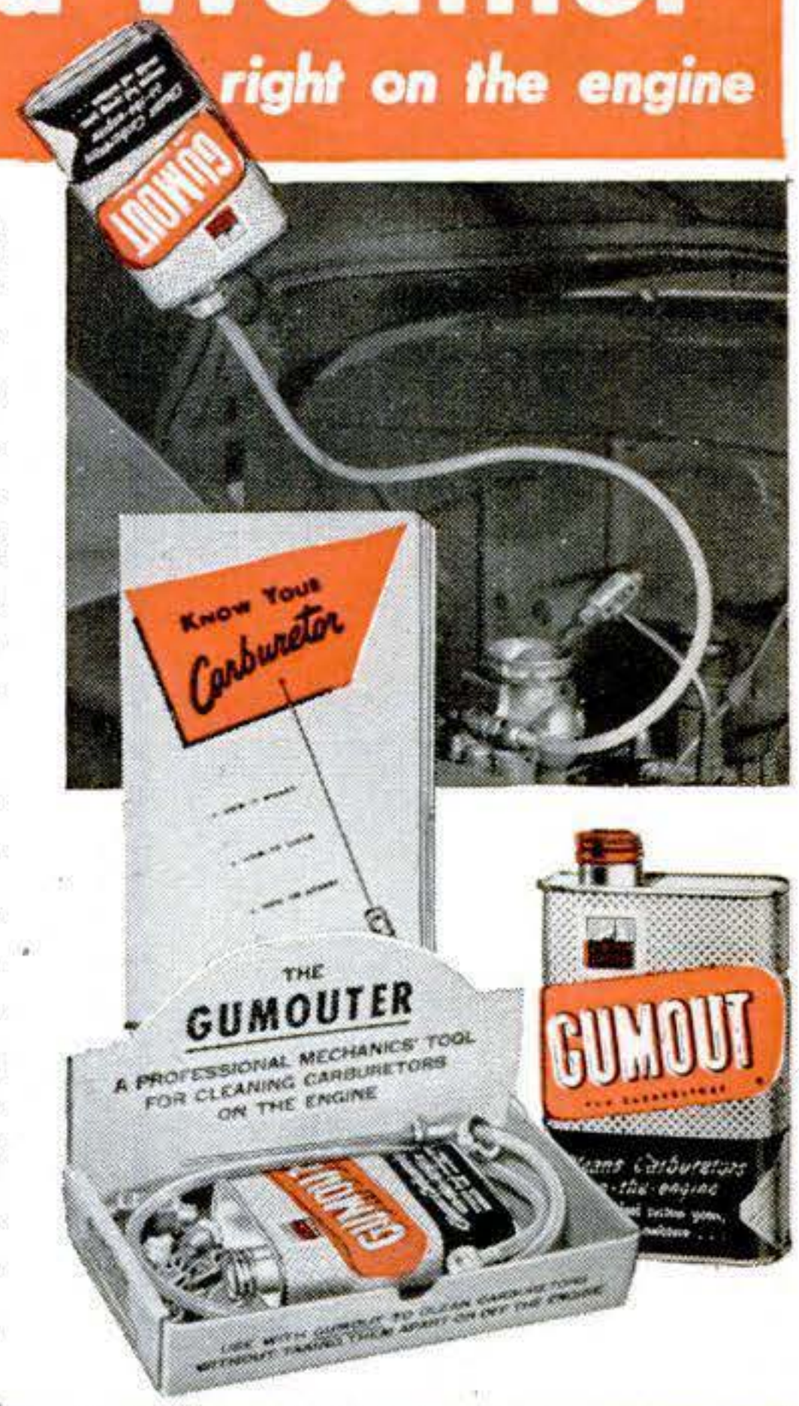
How A Clean Carburetor Aids Quick Starting In Cold Weather

An old problem now licked by cleaning carburetor right on the engine



Engine experts blame many mysterious cold-weather starting troubles on the tiny speck of dirt or film that cuts carburetor efficiency.

If your car is hard to start in cold weather—even though the starter spins the engine fast enough and spark plugs and points are right—you should suspect dirt in the carburetor.

Fortunately, the carburetor today can be cleaned of all dirt, muck, moisture, gum and varnish in less than 20 minutes without removing the carburetor from the engine. You merely disconnect the fuel line; use an inexpensive "applicator" to feed GUMOUT—a special cleaner—into the carburetor; then reconnect the fuel line.

"Clean the carburetor *first*" is the sensible approach to curing not only cold-weather starting problems but any case of poor engine performance. Frequently, this quick, inexpensive job will save much of the time and money often wasted in checking timing, adjusting spark plugs, replacing points—even making major repairs—in an effort to correct trouble actually caused by a dirty carburetor.

Pennsylvania Refining Company, 2688 Lisbon Road, Cleveland 4, Ohio has prepared a helpful *Carburetor Handbook*, which you can get free by writing the company. This firm markets the new carburetor cleaner under the name of GUMOUT. It sells for $1.50 a pint at most dealers. The applicator, called the GUMOUTER, sells for $4.75.

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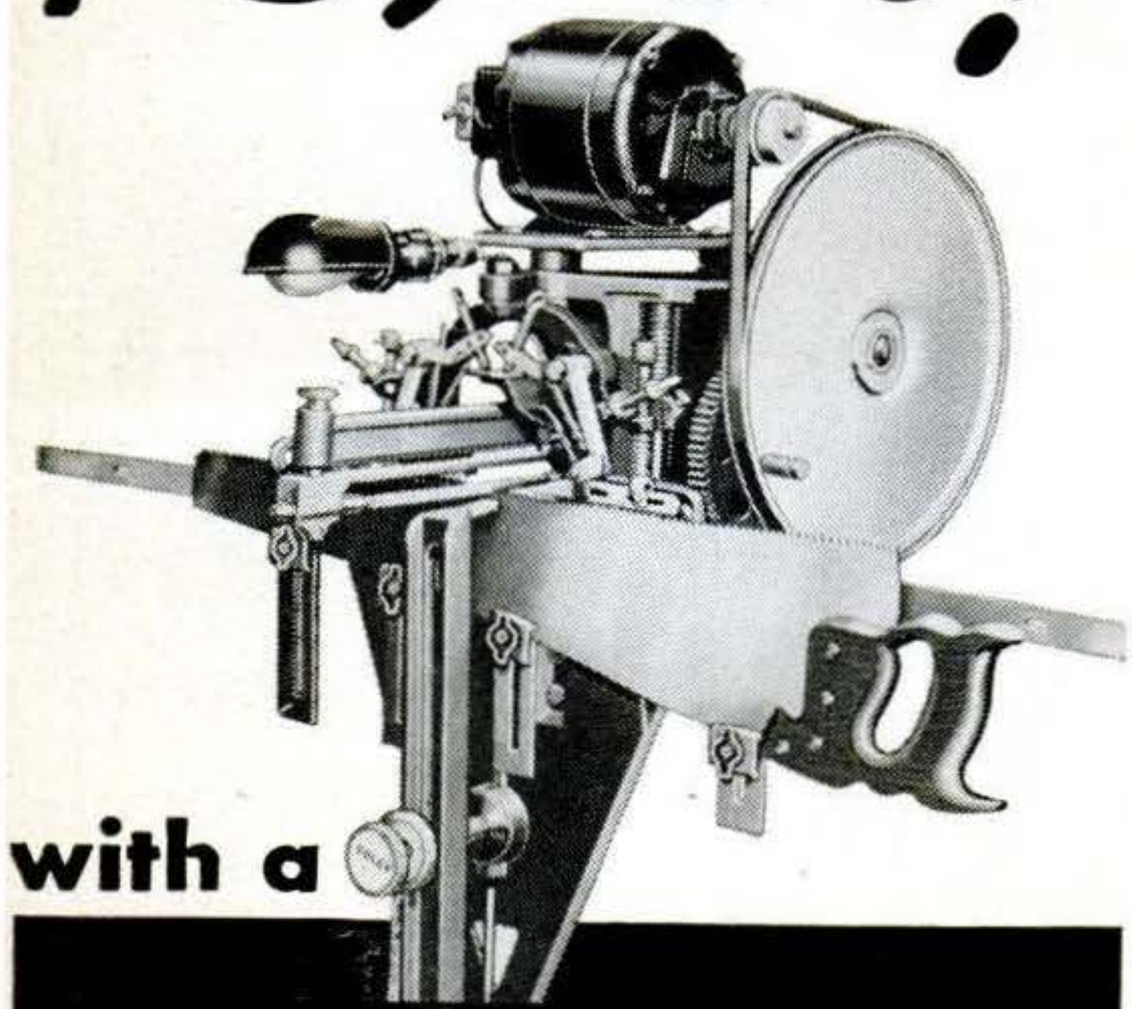

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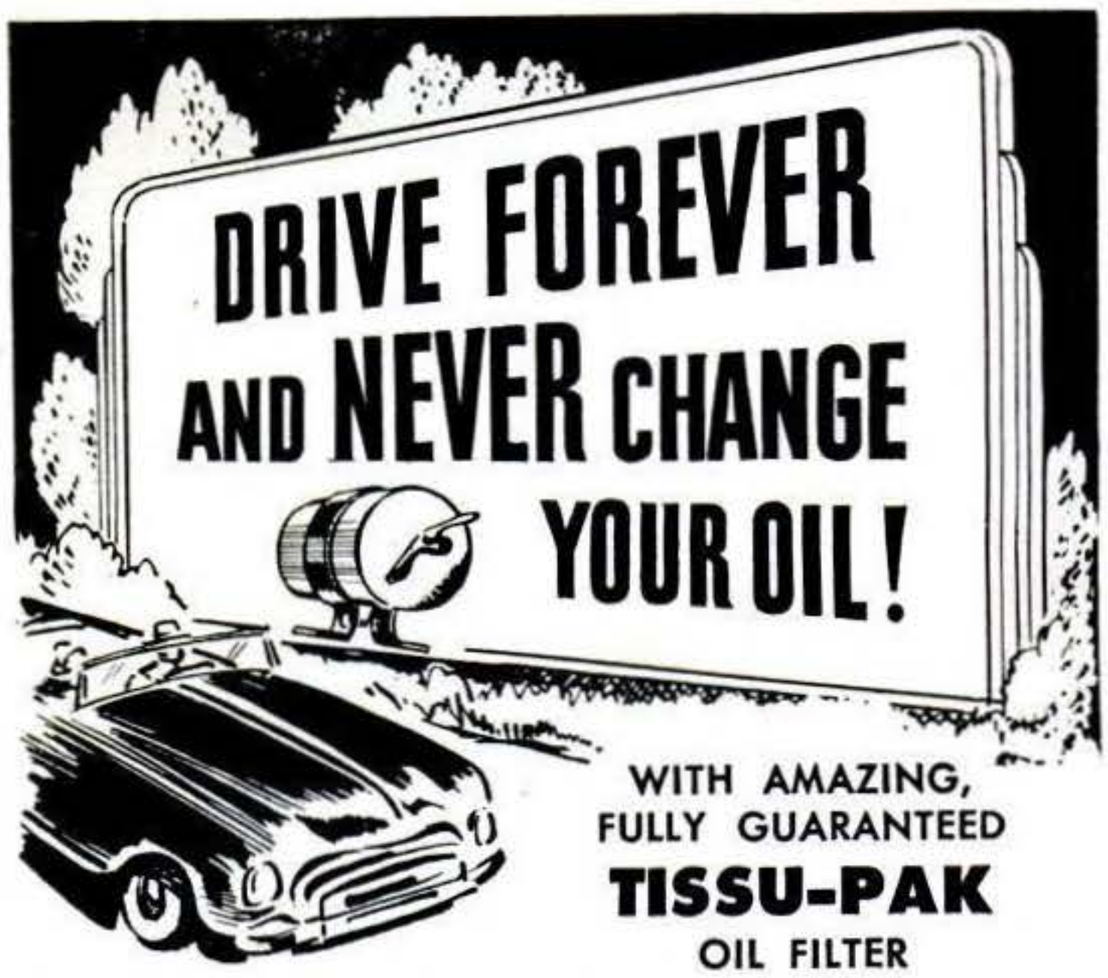

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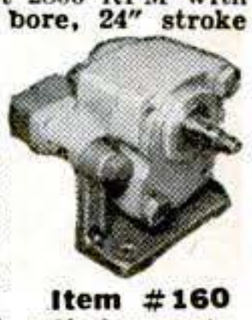

Item #160

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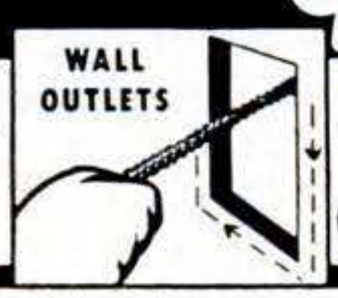

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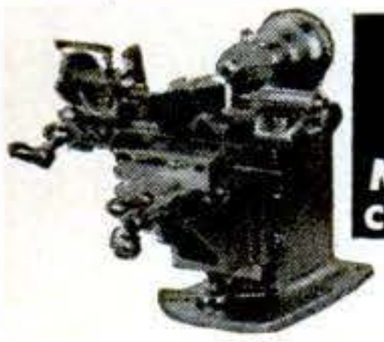

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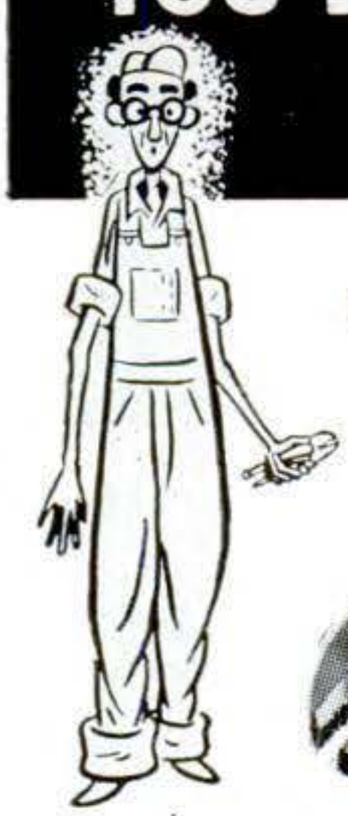

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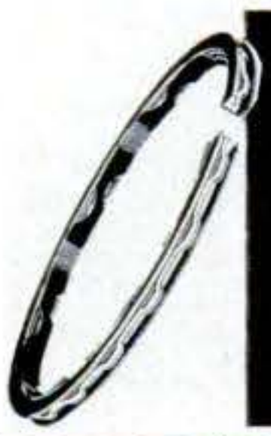

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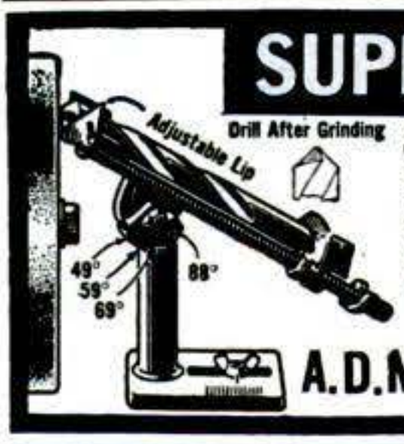

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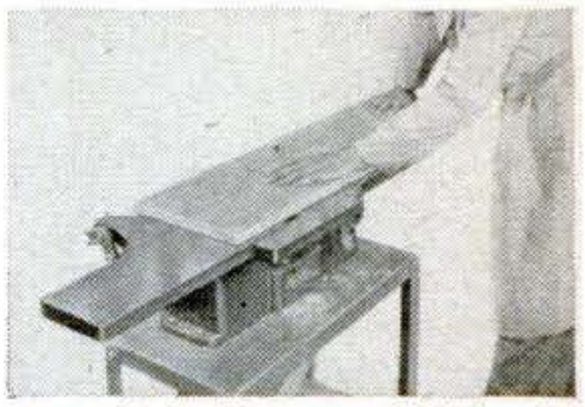

Rear table is wide to support big boards.

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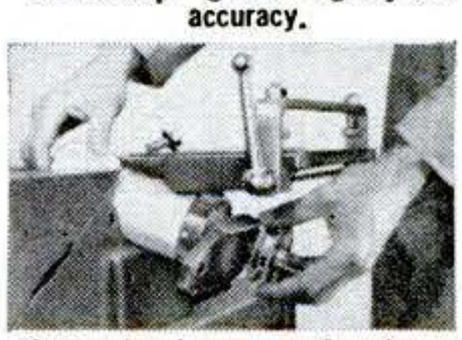

Cutter head removes for sharpening blades without disturbing their setting.

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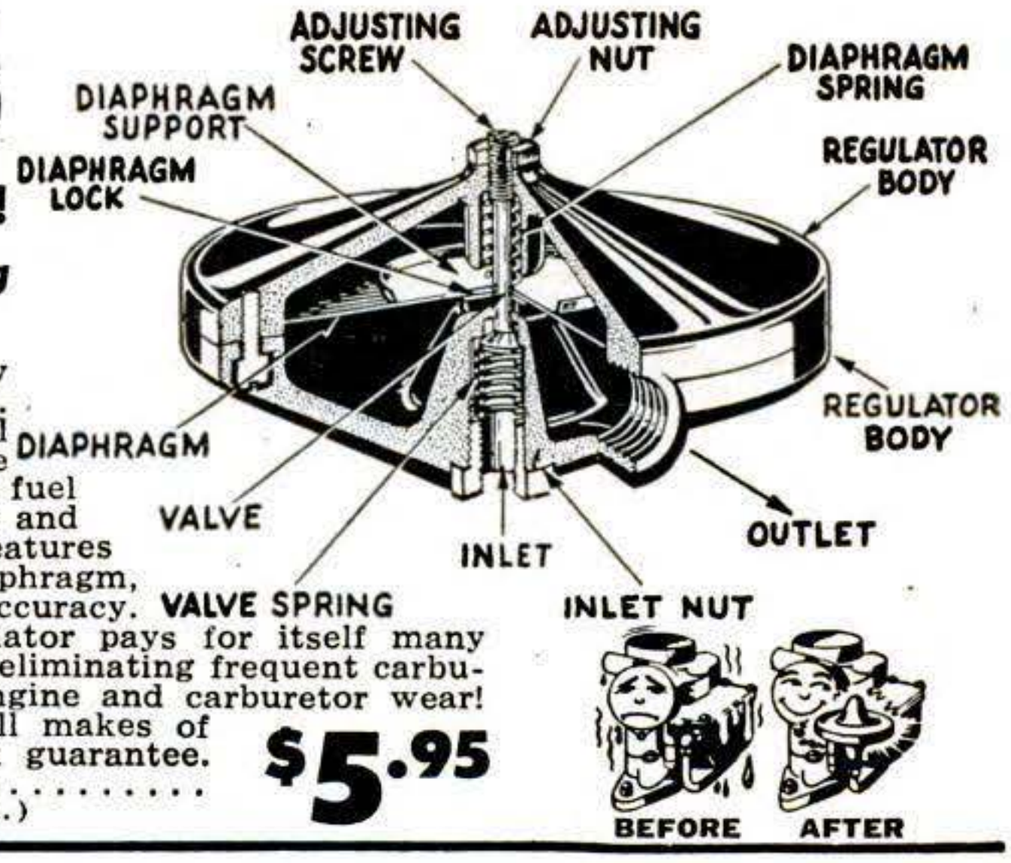

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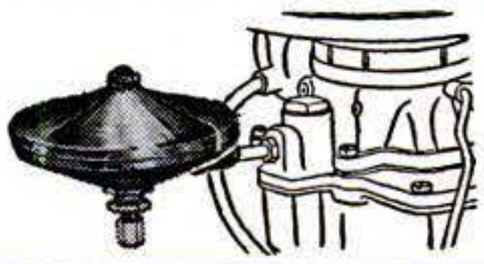

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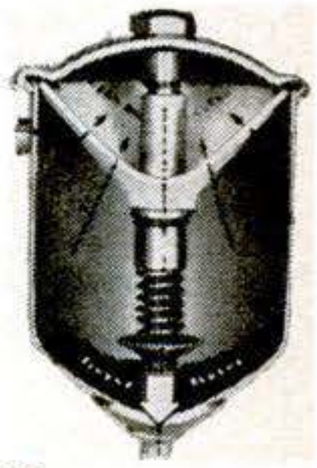

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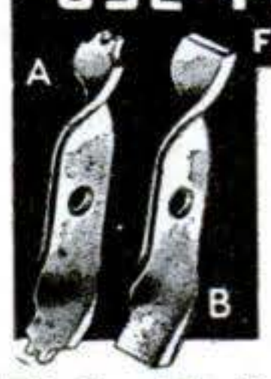

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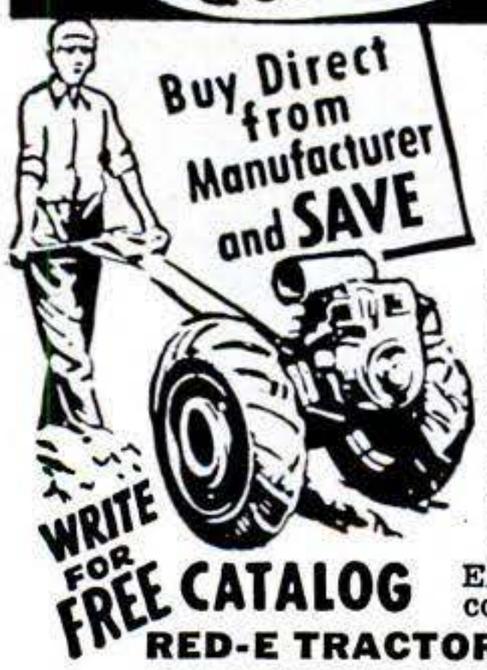

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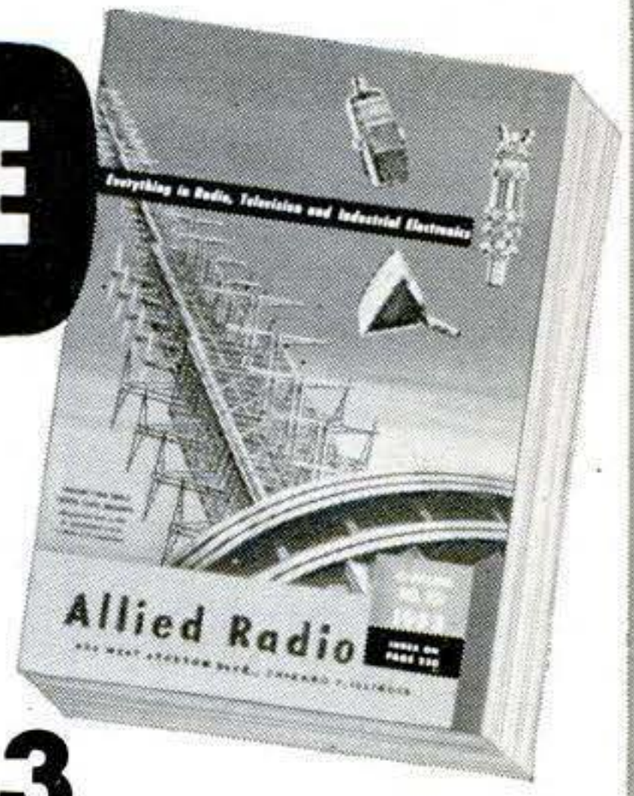

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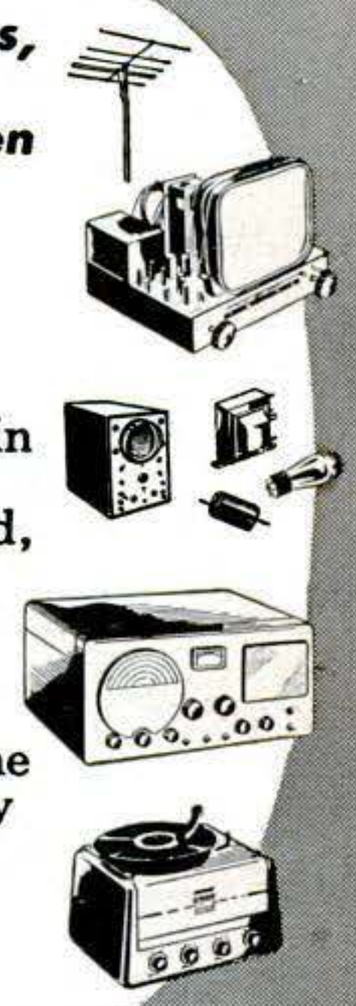

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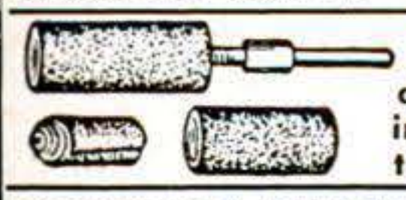

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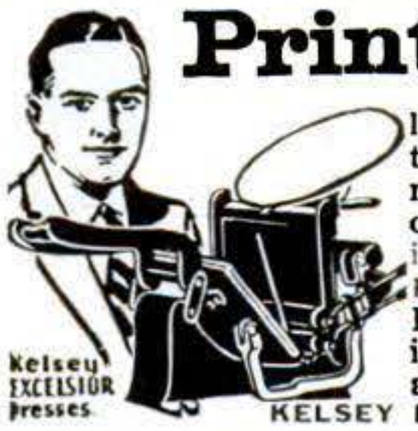

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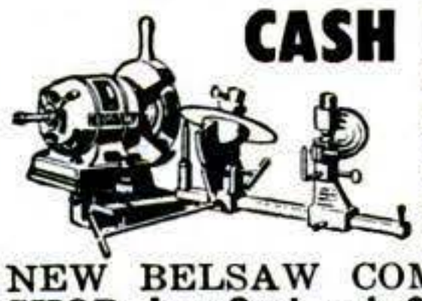

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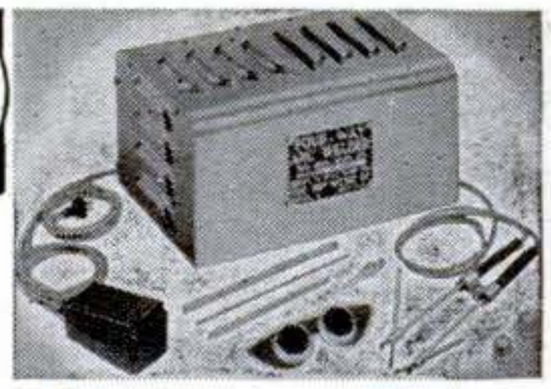

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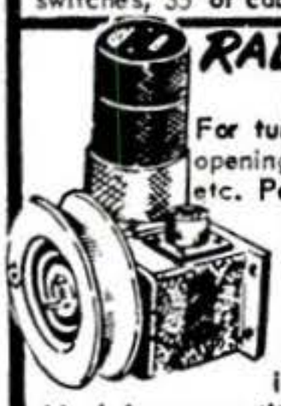

For tuning beam antenna, opening and closing doors, etc. Powered by 1/8 HP, 24V, GE motor, engaged to a gear reduction only when electrical contact is made. Operates in either direction. Ideal for an auxiliary power take-off. Has 150 RPM at take-off.

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Install this set of desk telephones for perfect, two-way communication between any two points up to 100 ft. This handsome set comes in a blue enamel finish. Has 2 phones, wire and simple hookup instructions. Operates on ordinary flashlight batteries. Here is the ideal set for use room to room, garage to house, barn to house, darkroom to outside, office to office or shop. Stock is limited! ORDER TODAY! **7.50**

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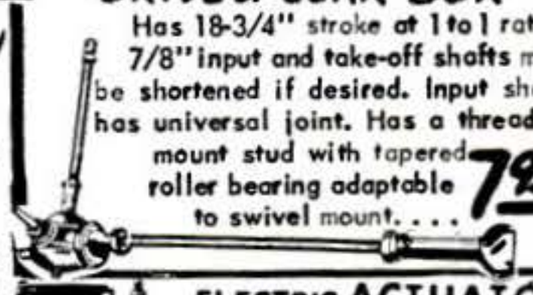

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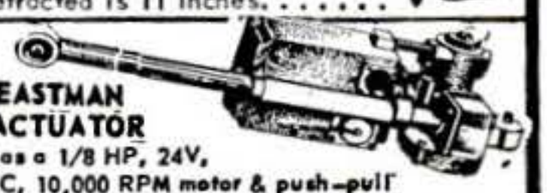

Has a 1/8 HP, 24V, DC, 10,000 RPM motor & push-pull actuator. Actuator has a 4" travel through a reduction gear box. Has adjustable limit switches and forward and reversing reversing relays. Overall length extended, 20"; retracted 15½". **12.95**

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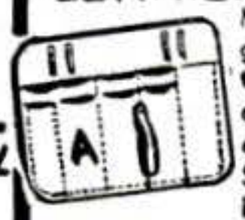

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36 to 1 G.E. (306 shaft RPM)
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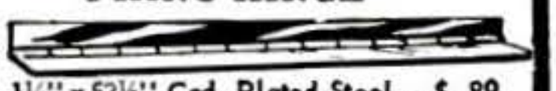

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1/16" – 4½¢ ft. (7x7)	7/32" – 11½¢ ft.
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1/8" – 7¢ ft. 7x19	5/16" – 16½¢ ft.
5/32" – 7½¢ ft. "	3/8" – 18¢ ft.
3/16" – 10½¢ ft. "	1/2" – 20¢ ft.

Stainless Steel Cable – Pre-Formed

1/16" . . . . 7¢ ft.	5/32" . . . . 20¢ ft.
1/8" . . . . 18¢ ft.	3/16" . . . . 23¢ ft.

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We also have available motors, tanks & fittings to adapt this unit. **23.95**

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A 24 volt solenoid is held from a fraction of a sec. to 15 seconds by a Time Delay mechanism. When coil is energized it operates a double pole, single throw relay switch. Can be used on electric locks, animated signs, labs, etc. Fully adjustable by set screw. **2.25**

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Mirror finished ¼" drill. In gift box, $19.95

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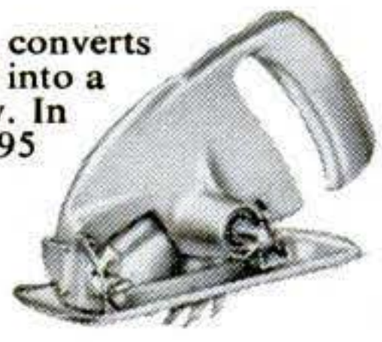

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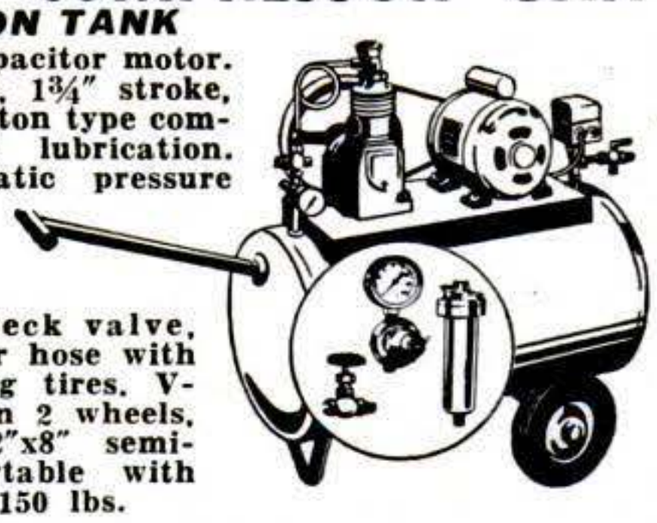

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With ⅓ h.p. motor Regular Price $175	With 1½ h.p. gas engine	Regulator, gauge and filter
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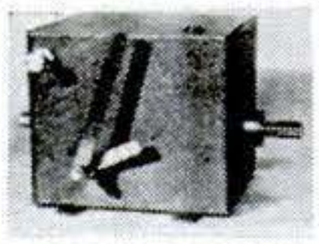

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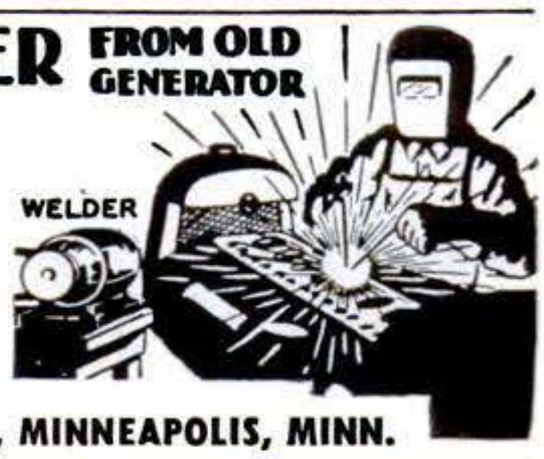

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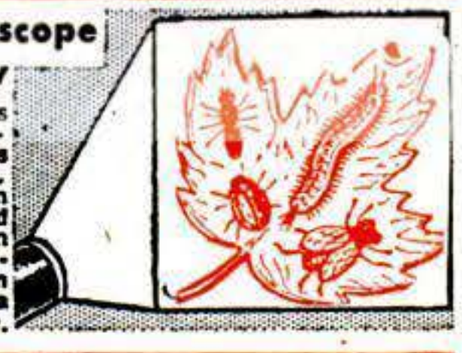

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No Skill—No Experience—Fun All Year Round Low-priced instrument that quickly pays for itself. No experience and no skill to operate. Just plug into any 110-volt AC-DC standard home socket. Years of entertainment and practical uses for every member of the family. Lasts indefinitely; nothing to wear out, so only cost is low price of **MIRACLE PROJECTOR.** Schools, shops, offices, artists, etc., all find many uses for it.

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[*Continued from page 126*]

hind the radiator for cooling. Dodge's old Fluid Drive (the simple fluid coupling) required no such cooler, and the engineers resolved that the new torque converter wouldn't, either. This they accomplished by giving engine and converter a common oil supply and putting fins on the converter casing to dissipate the heat. Also saved were two separate oiling systems and one pump.

Converter Helps Clean Oil

Thirteen quarts of oil take care of engine and converter. A big oil supply keeps the oil cleaner longer. The engine oil filter removes the dirt. The blades of the converter, acting like a centrifuge, help remove foreign material. The new detergents in today's oils do the rest.

And then there's an incidental profit. When the converter begins working on the oil, it heats up. In the winter, the warm oil trickling back into the engine brings the pistons and engine block to a proper operating temperature faster.

Memo: Dodge does recommend changing the oil *filter* every 5,000 miles.

The 1953 Dodge is all new—with one notable exception. It's lower, narrower and shorter, and yet it has more room on the inside. You can still get into it without knocking your hat off.

A new front-end suspension and "splayed" rear springs give a softer ride. The steering is changed in an effort to transmit less road shock to the wheel. The car abounds with little sophistications—you can open the glove compartment without its acting like a Fibber McGee closet. A curbing does it. You can open or remove the ash tray without having the grip of a bowler. And the defroster does its job on the whole windshield.

You Still Need a Left Foot

The one exception to the changes is a sliding-gear transmission behind the torque converter. You still have to use a clutch pedal to move the gear-selector lever. Once in drive range, you can drive all day long with only your accelerator and brake. Having to use the clutch, and to let up on the gas to get a gear shift, didn't bother me when I drove the new Dodge. But it may bother some people who cotton to the notion that a clutch is old hat.

I've got an idea that Dodge will trade its sliding-gear transmission for a planetary system one of these days, but both initial and operating costs will go up when they do.

Choice of Five Transmissions

With prices rising, Dodge is smart enough to realize that a lot of people won't want to put money out for new gimmicks. So for 1953 you can buy a simple three-speed transmission without a fluid coupling for the first time since 1941. You can also buy—at extra cost—a fluid coupling or an overdrive or the automatic transmission, known as Gyro-Torque. Don't get that confused with Dodge's Gyro-Matic, which is the old Fluid Drive with the gearbox. The company is still offering its six-cylinder engine, the same power plant that has satisfied millions of owners.

I liked that old four-cylinder Dodge in Indianapolis. And I liked the new one. One thing I especially appreciated was the doors swinging up as they were opened, to miss that high curb on the right side. END

"I" Had an Accident

"Injured"—said the driver.
"Inattention"—said the cop.
"Inflammation"—said the nurse.
"Incurable"—said the doctor.
"Incredible"—said the mourners.
"Inquest"—said the coroner.
"Interred"—said the undertaker.
"Income"—said the heirs.
"Intestate"—said the lawyers.
"Incourt"—said the judge.
"Insolvent"—said the bailiff.
"Impeach"—said the tombstone.
"Indoubt"—said St. Peter.

—*Fireman's Fund Record*

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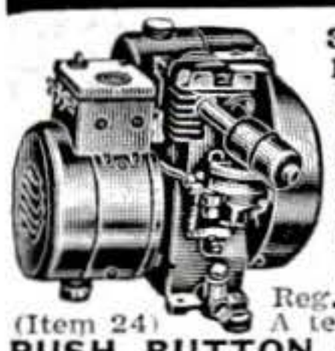
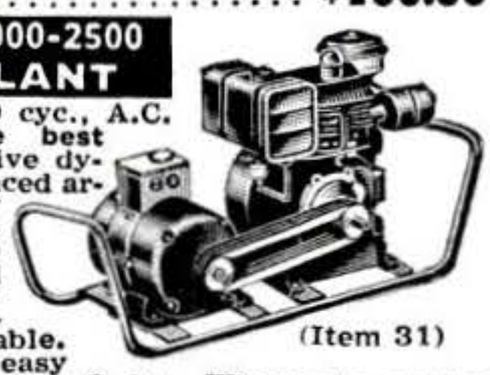


350 watts—115 v. D.C. powered by a sturdy, easy-starting 1½ hp. Briggs engine, perfect for lights, radios, razors, etc. in cabins or trailers. Use standard light bulbs. Built-in control box with receptacle—just plug in. Weighs only 65 lbs. Item 273. Reg. price $199.50. A terrific value at **$99.75**
(Item 24)

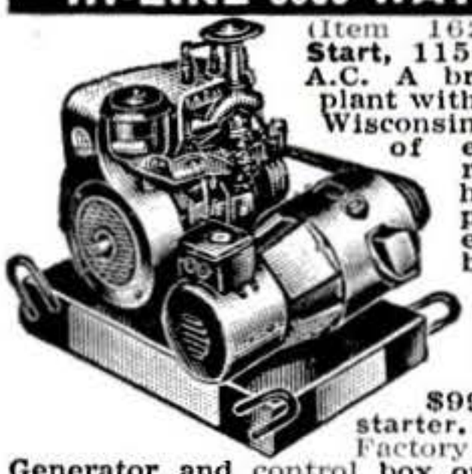
PUSH BUTTON START A.C. PLANT
500-700 watts—115 v.—60 cyc. A.C. Powered by a rugged 2 hp. easy-starting Briggs gas engine. No wiring necessary, just plug in and operate. Plenty of current for any oil burner, freezer, brooder, pump, emergency lights, etc. which require up to 700 watts. Ideal for Civil Defense, Fire Depts., trailers and camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. Item 24. Wt. 85 lbs. Fully guaranteed. **Be prepared if war or storm knocks out power lines.** Reg. $275 value..... **$143.50**
700-800 Watt Plant (Item 44) same as above but larger engine..... **$169.95**
1000-1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine **$199.50**

GIANT 2000-2500 WATT PLANT



110-120 Vo 60 cyc., A.C. **Absolutely the best made** — exclusive dynamically balanced armature: heavy windings develop up to 5000 watt overload for motor starting. Skid-mounted—portable. Powered by easy starting Briggs or 6 hp. Wisconsin engine —complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty and instructions included. Wt. 220 lbs. Reg. $585.00. Special at... **$299.50**
(Item 31)
With Electric Self Starter (Item 179) **$359.50**
GENERATOR ONLY and control box. Drive it with your engine or tractor.. **$169.50**

HI-LINE 6000 WATT PLANT



(Item 162) **Push Button Start,** 115-230 v. 60 cycle A.C. A brute of a power plant with a rugged 13 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth $995.00. **With self starter.** Factory Spec. **$645.00**
Generator and control box only, belt driven. Use your engine or tractor. Wt. 240 lbs..... **$345.00**
Write for information on any sizes not listed
Buy Wholesale—Direct From Factory—World's Largest Direct Selling Light Plant Factory
You can pay more — but you can't buy better

HEAVY DUTY POWER CABLE

#12—2 Cond.—stranded, very flexible, rubber covered, special outside conductor for grounding power tools, etc. Finest heavy duty power cable made. U.S. Surplus.
50 ft. (Wt. 8 lbs.) Item 199.....**$6.95**
100 ft. (Wt. 16 lbs.) Item 200.....**$12.95**

MASTER AIR COMPRESSOR

(Item 209) High pressure type for large volume of air for heavy duty service. For paint spraying, inflating truck and auto tires, greasing, and the hundreds of other jobs done by compressed air. Piston type. 2" bore compressor with built-in air filter. Master built with hi-strength alloys and precision bearings. Stainless steel tank, 12" x 24", 2100 cu. in. cap. Safe up to 500 lbs. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lbs.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck. Beautifully balanced on ball bearing wheels and rubber tires. Note low factory prices.
With ⅓ hp 110 v. A.C. motor (Reg. $175.00) (Item 209)..... **$98.50**
With ½ hp motor (Reg. $199.50) (Item 209A)..... **$119.50**
With 2 hp Briggs Gas Engine (Reg. $199.50) (Item 209B). **$109.50**
Write for price of compressor only.
A complete line of spray guns and air tanks available at factory prices. Write for Catalog.

Factory Prices on Catalog Items
Send 10¢ for BIG 1953 catalog. Hundreds of bargains

SAVE UP TO 85%

HEAVY DUTY D-C ARC WELDER

(Item 38)

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to ¾" plate using ¼" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2600 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and double V belt or flat pulley. You can pay more, but you can't buy a better welder. Wt. 110 lbs. $400 value at. **$99.75**
DUAL CONTROL MODEL same as above but with built-in dual rheostat for low heat soldering, brazing, welding. Spec. **$119.50**
WELDING KIT. Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **$10.50**

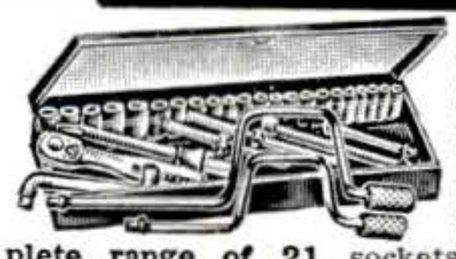
COMMANDO MOTOR BIKE

SPEED TO 40 M.P.H. TRAVELS ON ANY KIND OF ROAD. AMAZING 5 YR. GUARANTEE
The Commando Motor Bike is new throughout. Advanced engineering—Automatic Clutch provides quick acceleration and easy hill climbing—yet motor idles at will when you stop. No belts or chains. Rugged lightweight 2-cycle engine delivers dependable power with long life. Transmits power direct to rear wheel with modern Dynarotor. Easy automatic pedal or pull starting. Special control permits pedalling if desired. Perfect balance and comfort. Anyone can ride a Commando Motor Bike—safe and easy. Rear mounting of motor eliminates hard steering, dirt, fumes and heat. Really trouble-free! Rugged heavy duty cycle, custom built by famed Schwinn. Ride for health and pleasure; ride to work or school; make deliveries. Order now as wonderful gift for yourself or for dad, son or brother. Easy payments available. Ask for free circular.
The Commando Motor Bike Captain, (item 90) 1 cyl.—1½ hp., $250 value! complete—no extras to buy..... **$199.50**
EXTRA! Convert your own pedal bike into a motorized miracle in one hour with a Commando Motor. Complete with easy-to-follow fittings and instructions (item 91). **$125.00**

79 Pc. CARPENTER'S TOOL SET

Professional quality. A complete set of Master Mechanic tools featuring the famous **Stanley** brand. All neatly arranged in a beautiful sturdy 32" hvy. steel tool box. Set includes: Powerful ¼" Electric Drill (optional), 3 Stanley Wood Chisels, 29" Spring Steel Saw, Steel Bench Vise, Tin Shears, 9 Drill Bits, Sharpening Stone, 8" Plane, 24" Stanley Level, Hacksaw, Stanley Rule, 5 Double End Wrenches, 13 Asst'd. Hacksaw Blades, Stanley Hand Drill, 10" Vise Wrench, Comb. Square, Stanley Hammer, Stanley Ratchet Brace, Coping Saw, 7 Coping Saw Blades, Steel Wrecking Bar, 4 Screw Drivers, Offset Screw Driver, Nail Set, 4 Asst'd. Files, 8 Pc. Allen Wrench Set, Auger Bit Set and many other tools. Worth at least $150.00 if purchased separately. Save cost of tools on one or two jobs. A terrific value.
Item 242. Wt. 41 lbs. (without Electric Drill) **$39.50**
Item 242A. Wt. 45 lbs. (incl. Electric Drill)..... **$49.50**

32 Pc. SOCKET SET



32-pc. Socket Set (Item 59) Highest quality guar. non-breakable sockets made by Husky. Beautiful, matched chrome alloy, absolutely the best. Complete range of 21 sockets from ¼" thru 7/16" in ¼" drive and 7/16" thru 1-1/16" in ½" drive; 2 extensions, reversible ½" ratchet, adaptor bit, slide head, all angle coupling, 2 end wrenches, ¼" speeder handle and sturdy metal tool box. For prof. mechanics who want the best. Wt. 14 lbs. Easily worth $41.50. While they last. **$16.95**

45 Pc. SOCKET SET

(Item 205) Contains a complete set of sockets in ½" drive, ⅜" drive and ¼" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. Beautiful matched chromed thin wall alloy sockets in a sturdy handsome steel tool box. Wt. 17 lbs. List Price $62.90. Factory Special.. **$26.95**

HYDRAULIC JACKS

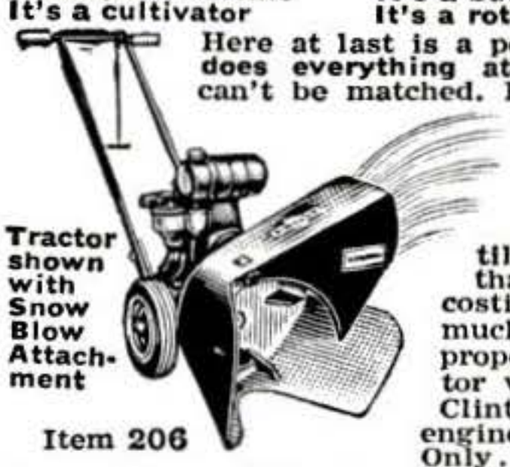
(Item 208) Heavy duty, precision built, smooth, positive acting with built-in relief valve. Hi-Lift with screw extensions. Govt. surplus at a fraction of orig. cost. (Handle included.)
1½ ton (Item 208) Wt. 11 lbs..... **$6.45**
3 ton (Item 208A) Wt. 15 lbs. **$9.45**
5 ton (Item 208B) Wt. 17 lbs. **$11.45**

HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range, removes kitchen smoke and odors. Powerful continuous duty motor, 110-120 v. A.C. Quiet, super efficient fan moves huge volume of air (400 to 600 c.f.m.) 8" Fan, wt. 5 lb. **$6.85**; 9" Fan, wt. 6 lbs. **$7.85**; 10" Fan, wt. 7 lbs. **$8.85**; 12" Fan, wt. 8 lbs. **$9.85.**
Heavy-duty 12" fan, enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, and other difficult applications. Wt. 12 lbs. Item 10D.....**$12.95**

MASTER SNOW BLOW SELF-PROPELLED

It's a lawn mower
It's a power sickle
It's a cultivator
It's a plow
It's a bulldozer
It's a rotary tiller

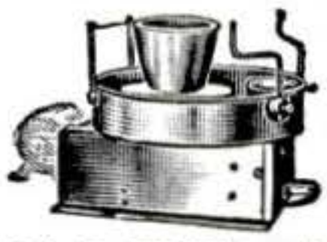


Tractor shown with Snow Blow Attachment
Item 206

Here at last is a power unit that **does everything** at a price that can't be matched. Does a terrific of easy, fast snow removal. Safety clutch—can't burn out. More versatile and efficient than tractors costing twice as much. Basic self propelled 2 hp tractor with Briggs or Clinton famous engine. Only... **$119.50**

Snow Blow ..$29.50
Rotary Tiller .$42.50
Sickle Bar-Mower $42.50
Bulldozer ...$11.25
Lawn Mower Hitch ....$ 4.50
Cultivator ...$ 8.75
Freight prepaid to most areas. Easy payments.

POTTER'S WHEEL



Power Driven — Foot pedal speed control
New compact modern design. Precision built to meet exacting requirements of professional artists — the finest wheel ever built. Mechanism fully enclosed for safety and to exclude moisture and clay. Foot-controlled variable speed drive provides instant, smooth speed range of 30 to 150 rpm. Equipped with adjustable arm rests. Easy to operate — even for handicapped persons. Reversible 10" throwing head — back side recessed for casting plaster bats. Larger **18x18"** throwing table; wedging wire attached; removable water cup inside. Heavy bronze bearings pre-lubricated, sturdily built for long, dependable service. Use ¼ hp motor (not incl.). Shipped fully assembled—just mount wheel and motor on table or sheet of ¾" plywood. Self storing—tip up on edge. Wt. 45 lbs. List price $125. Factory special. **$64.50**
¼ HP 115 V. A.C. Motor for Potter's Wheel, wt. 27 lbs. (Item 258) **$15.00**

EXTENSION CORD

(Item 16) 40 ft. heavy duty, made of specially insulated No. 14 2-conductor wire. So tough that you can drive over it and yet flexible and easy to handle. Resists oil, grease or water. Extends electricity up to 400 ft. without voltage drop. Use indoors or out. Complete with heavy rubber plug and outlet. Wt. 2½ lbs. Usually $4.50—Special 40 ft. **$1.99**
Comb: 2-40 ft. and 1-20 ft. (total 100 ft.) **$4.95**
100 foot length (one piece)..... **$4.85**
WIRE ONLY (Item 50) No fittings. 100 ft. **$4.00**

All items brand new. Prices f.o.b. Chicago area. 10 day Money back guarantee. Send check or M.O.

MASTER MECHANIC MFG. CO., DEPT. 36B Burlington, Wis.

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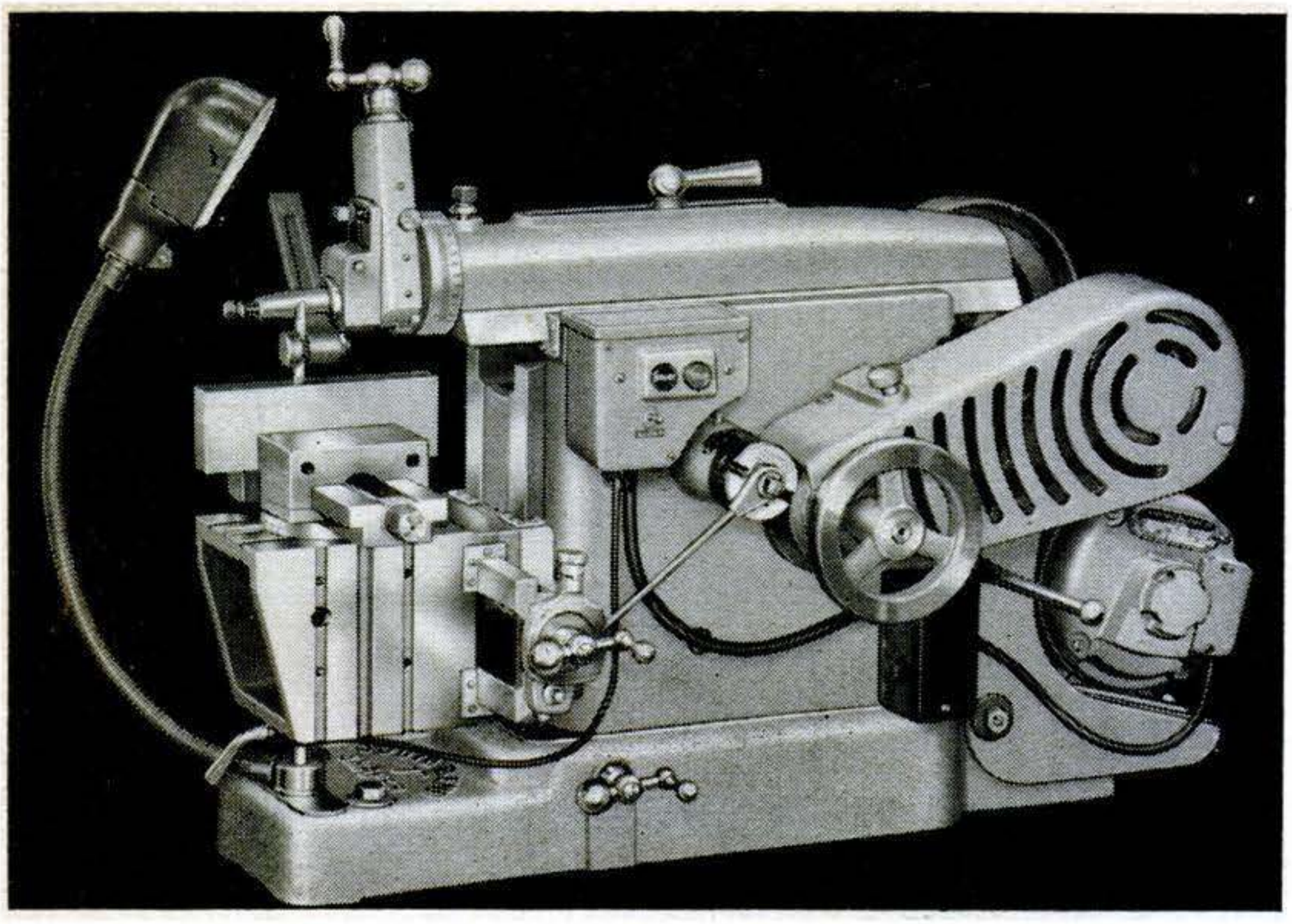
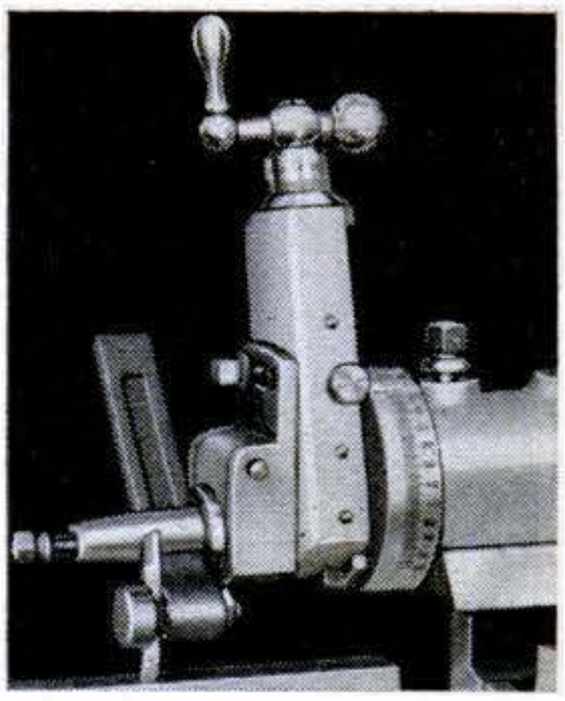
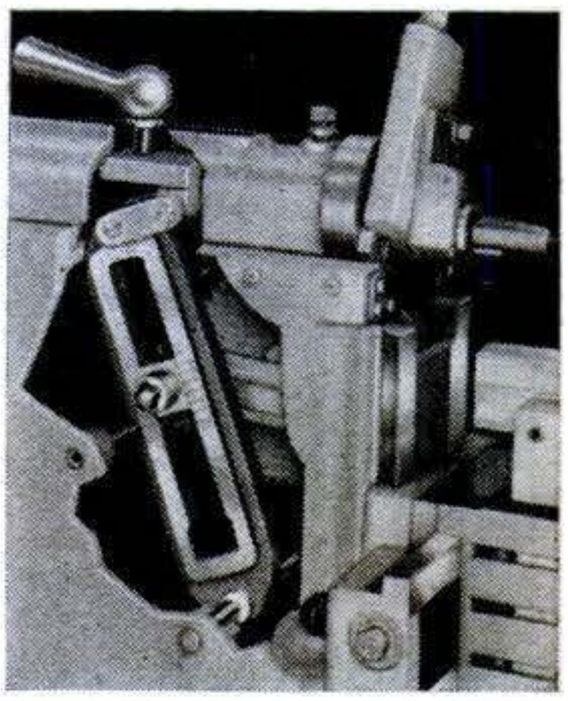
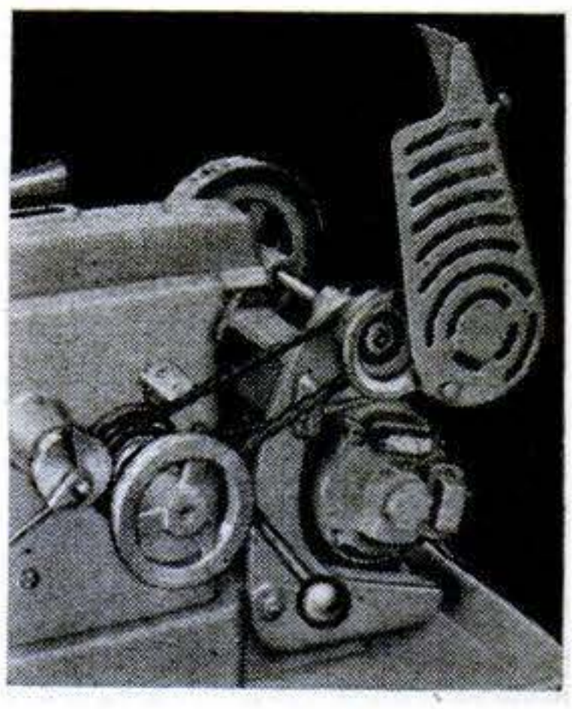




Tool head locks in any position. Rugged clapper box is adjustable.



Rocker and crank with graduated eccentric adjustment for stroke.



Guards on all pulleys and belts. Quick-acting belt tension release.

SOUTH BEND
7" PRECISION SHAPER

Precision engineered and sturdily constructed, this compact bench shaper has the built-in accuracy and rigidity for rapid machining on small parts. The stroke rate per minute is higher than for larger shapers, permitting greater production on work within its capacity. The ease of setting up work in the bench shaper, its high operating speeds, and low power consumption keep costs at a minimum. A number of practical attachments can be supplied to increase its versatility on toolroom, production, or maintenance work. Check coupon for literature.

SPECIFICATIONS: RAM—Stroke length—0 to 7". Strokes per minute (4)—42 to 195. Cutting speeds—3 to 114 feet per minute.

TOOL HEAD—Vertical feed—3". Swivels—360°. Tool post opening—13/32" x 7/8".

TABLE—Horizontal travel—9 1/2". Vertical travel—5". Power cross feeds (6)—.002 to .012". Ram clearance—1/2 to 5-1/2". Table size—5-3/8 x 5 x 6-5/16".

VISE—Jaw width—4". Jaw depth—1". Maximum opening—4". Swivel base.

SEND INFORMATION CHECKED:

☐ _____

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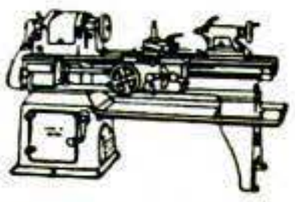
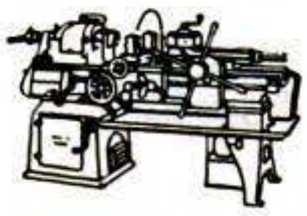
☐ 9" and 10" BENCH LATHES

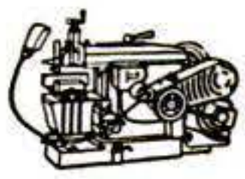


☐ 10" to 16-24" FLOOR LATHES



☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES



☐ 7" BENCH SHAPERS

Name_____ Company_____

Street_____ City & State_____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

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$3.98

UBLE pacity 5.95

This is the average earning reported WILLIAM F. WYDALLIS. "The sky's th profits because of America's serious no extinguishing discovery.

WOULDN'T YOU like to be making the kind of money William F. Wydallis is making? His story (printed at right) is just one example of the brilliant success that Presto salesmen are meeting everywhere!

A Florida salesman earned $600 in one month. An Ohio man earned $2100 in two months. A New York salesman earned $1500 in one month. A New Hampshire salesman added the Presto as a *sideline* and picked up an extra $1800 in 20 months.

Help Save Your T
pan bursts into
minutes the enti
flames like these
representatives

OVER ONE MILLION ALREADY

PRESTO contains an amazing new chemical—"Chlorobromomethane" or "C.B." The Germans developed "C.B." as a secret defense against fire during the war. The Dow Chemical Company, acquired the formula from the U. S. Government and began manufacturing it here. Then we (Merlite Industries) designed a *handy—yet amazingly effective—fire extinguisher* to contain and release this new wonder-chemical.

Lab. Findings on "C.B."

In comparing the effectiveness of "C.B." in fighting various kinds of fires an authoritative testing laboratory states: "It has been proved that 'C.B.' is *about 1.5 to 6 times as effective as other common extinguishing agents on an equal weight basis.*"

PRESTO Contains "C. B." (Chlorobromomethane), the same chemical the U. S. Air Force specifies for fire-fighting in B-36s, B-29s and other U. S. aircraft. No wonder Presto puts out fires in as little as 2 seconds and is called Science's "Midget Miracle."

This extra effectiveness of "C.B." means that Presto can be made light and handy enough for even a woman or child to use. No pumping—no heavy tank or tangled tubes to struggle with. Just a twist of the knob . . . and flames disappear! "Sells on sight" to owners of homes, cars, stores, farms, service stations, boats, motorcycles, factories, offices.

Why Large Presto Profits Are So Easy

Everyone is terrified at the very *thought* of FIRE! *Every year* fire kills more than 11,000 people—and destroys over SEVEN HUNDRED MILLION dollars worth of property in the U. S. The annual fire toll is more than DOUBLE what it was 10 years ago! Millions of peop for this sure, simple, guard. So most peop action immediately wa —ESPECIALLY WH ONLY $3.98 EACH

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Get Started No

Get started in this Don't "put it off"! Ev cost you $10, $15, o otherwise be making. for everything you ne away! **MERLITE INDUS 201 East 16th Street**

Only Presto Has ALL These Features

- Ends Fire as Fast as 3 Seconds
- Chemical Contents 1.5 to 6 Times More Effective than Others on Equal Weight Basis
- Weighs Less Than 1 lb.
- Easily Held in One Hand—Even by a Child
- Needs No Inspection or Re-Charging —Does Not Corrode or Deteriorate
- Costs Only $3.98—Yet Out-Performs Bulky Extinguishers Costing Several Times As Much
- Automatic Pressure—No Pumping
- Guaranteed for 20 Years—Certificate Packed with Every Presto

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High compression engines and efficient car-heaters make non-evaporating anti-freeze more important now than ever. There's not one drop of boil-away alcohol or methanol in "Prestone" anti-freeze.

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With "Prestone" brand anti-freeze in your car, you're sure you've bought the best. It's America's No. 1 brand. No other anti-freeze gives your car the same complete protection. It's guaranteed!

No other anti-freeze gives your car the same complete protection

$3.75 PER GALLON

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One shot lasts all winter

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